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OBSERVATIONS

ON

CHOLERA,

&c. &c.

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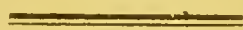
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OBSERVATIONS  
ON  
THE NATURE AND TREATMENT  
OF  
CHOLERA:  
AND ON THE  
PATHOLOGY OF MUCOUS MEMBRANES.

BY  
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MADRAS MEDICAL ESTABLISHMENT;  
AND LATELY IN MEDICAL CHARGE OF THE CIVIL DEPARTMENT  
IN THE SOUTHERN MAHRATTA COUNTRY.



EDINBURGH:  
MACLACHLAN AND STEWART, EDINBURGH;  
AND SIMPKIN AND MARSHALL, LONDON.

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## P R E F A C E.

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THE following Observations on Cholera are the result of considerable experience in the treatment of that disease. The first cases of it which the Author witnessed, were a few that occurred in the 3d Regiment of Native Cavalry, at Hydrabad, in 1823. In May 1824, it prevailed to a great extent, for two or three weeks, in the troop of Horse Artillery stationed at Kulladghee, and of which he had then charge : and in the months of April, May, and June 1825 and 1826, he had ample opportunities of studying the disease at Darwar ; for it then raged with great virulence among the prisoners in the jail ; in the 5th Regiment Native Infantry ; among the native inhabitants of Dar-



war, and also in many of the other towns and villages throughout the district. As he had permission to open the body of every patient who died in the jail, he had thus a better opportunity of becoming acquainted with the autopsy of the disease, than usually falls to the lot of medical men in charge of native patients.

It is rather a curious circumstance in the history of Cholera, that, for the last seven or eight years, it has made its appearance regularly every year, in the Southern Mahratta country, in the month of March or April, generally commencing in the southern parts, leaving one village to attack another; thus gradually proceeding northward, and disappearing in June or July, after the commencement of the heavy rains.

Native doctors, with supplies of medicine, and instructions for the treatment of Cholera, were deputed by the Author (by order of Government) to those parts of the district where the disease was known to prevail; and the information which he thereby obtained



proved useful, in enabling him to confirm some of his opinions regarding the nature and treatment of the disease.\*

It is not the Author's intention to give a history, or detailed description of Cholera; for these are not now required, since we are in possession of the reports of the different Medical Boards, and various other excellent works on the disease: but by associating the observations of others with his own, he proposes to investigate its pathology, and endeavour to explain its symptoms, and the mode of action of the various remedies which have been employed for its cure.

From his first attempts to investigate the nature of Cholera, the Author was convinced that its pathology was still far from being correctly understood; and from observing that in every case, the mucous system, from the very com-

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\* The total number of deaths from Cholera in the Darwar district, in 1826, as ascertained from the returns sent to the principal collector by the local native officers, was 3055. The total population of the district is not known.

mencement of the attack, bore the principal onus of the disease, it occurred to him, that most probably, it was to this system we must look for its pathological cause. But he soon found, that in order to investigate satisfactorily, what share the diseased conditions of the mucous membranes had in the production of Cholera, it would not only be necessary to ascertain their state in this disease, but to be acquainted with their general pathology, and with the effects which their derangements produce on the other systems of the body. These considerations have induced him to prefix a few general remarks on the pathology of mucous membranes, with the view of elucidating the subject which forms the more immediate object of the Essay; and should they be found correct, they will probably prove still farther useful in their application to other diseases of the various organs that are intimately connected with the mucous system.

*Darwar, May 1827.*

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This Essay was read before the Medical Society of Madras, and would have been published in their Transactions, had the Author remained in India; but having been compelled, on account of bad health, to return to Europe, he considered it more advisable, for various reasons, which it is not necessary to state, to publish it in this country.

The Essay is nearly the same as when originally written in India, except that advantage has been occasionally taken of the very valuable observations on Cholera, contained in the works of Mr ANNESLEY; and also of the recent observations of some of the French pathologists, on the mucous membranes. None of these works were seen by the Author before his return to this country. He was at a station five hundred miles from the Presidency, where he

could have access to no extensive library. His views, therefore, are entirely the result of his own observations; and their now being found to be consistent with the facts observed by the authors above mentioned, will doubtless be considered as a strong proof of their accuracy,

*Edinburgh, July 1828.*

PATHOLOGY  
OF  
MUCOUS MEMBRANES.

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INFLAMMATION, while it is the most frequent, appears also to be the most simple morbid condition, to which the various textures of the body are liable; and in almost every texture, disease, however much it may vary in its progress and termination, is, with few exceptions, ushered in by inflammation.

I will endeavour to shew, that the mucous system affords a remarkable exception to this general rule; for, in addition to inflammation, it is liable to another simple morbid affection, viz. catarrh, which often occurs alone, without being accompanied, or having been preceded by, inflammation. I conceive, then, that mucous membranes are liable to two distinct kinds of diseased action, viz. *inflammation*, evinced by one or more of the

following signs, viz. increased heat, pain, redness, and swelling, and *catarrh*, characterised by the secretion of the membranes being depraved, and increased in quantity.

However much authors may differ in regard to the proximate cause of inflammation, it is universally admitted, that it is owing to *some affection of the capillary vessels which connect the extreme arteries with the veins*. It is equally evident, that *catarrh* arises from some affection of the secretory apparatus of mucous membranes. When this has its action increased, there is an increased flow of the natural secretions of the membranes; *and when it has its action not only increased but deranged, the secretion of the membranes is both increased and depraved*. It is to this latter affection that I wish to apply the term *catarrh*, in the following investigation.\* It is of great con-

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\* I am not without many precedents for extending the term *catarrh* to various other mucous membranes, besides those of the nose, eyes, and fauces; for we read in different authors of *Catarrhus Intestinorum, Vesicae, Ventriculi, &c.* Vide SCHNEIDERUS de *Catarrhis*, JOHNSON on *Climate*, PARR'S *Medical Dictionary, &c.*



sequence, always to keep in mind, that it is not to the diseased fluid we must apply this term; the morbid condition of the secretory apparatus alone constitutes the disease, of which the diseased secretion is simply the effect.

It has been stated as a general law, by several eminent authors, that inflammation of mucous membranes is accompanied by increased mucous secretion; and pathologists almost invariably attribute catarrh to an inflammation of the mucous membrane in which it occurs.\* This, I apprehend, is far from being correct; for are there not numerous examples of inflammation of a mucous membrane without increased secretion, and of catarrh without inflammation? We have examples of the former in ophthalmia, inflammatory sore throat, some cases of gastritis, and perhaps also of enteritis: of the latter,

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\* This is the opinion of LAENNEC. Vide *De L'Auscultation Mediate*, T. 2. p. 65. It also appears to be BROUSSAIS' opinion.



in a few cases of common catarrh, in diarrhoea, and also (as I shall have occasion to shew in a future part of this Essay) in Indian Cholera.

Acute bronchitis frequently affords an excellent example of simple inflammation of a mucous membrane, without increased secretion. In some cases of it, the secretions during the first stage are diminished; and then, an increased secretion from the inflamed membrane always relieves the disease.\* In the first stage of gastritis, and of enteritis, the secretions of the gastro-enteric mucous membrane are generally diminished; and these diseases also are relieved by an increased flow of the natural secretions of the membranes. These examples sufficiently prove, that inflammation may occur alone in a mucous membrane, without being accompanied by increased secretion.

There are also numerous examples of ca-

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\* Vide HASTINGS' Treatise on Inflammation of the Mucous Membrane of the Lungs, p. 161.

tarrh without inflammation. Common catarrh of the air passages, without inflammation, is familiar to every one. Diarrhoea generally does not exhibit the slightest symptom of inflammation ; and in it, the secretion of the enteric mucous membrane is increased and vitiated.

There is a species of diarrhoea endemical in some parts of the Southern Mahratta country, the symptoms of which are frequent and copious dejections of a serous fluid, a small pulse, and sometimes coldness of the skin, without the slightest symptom of inflammation. When it continues, however, for a length of time, inflammation generally supervenes ; and the enteric mucous membrane, when examined after death, presents various diseased appearances. But in one case, in which the diarrhoea had continued a very long time, and at length proved fatal, the mucous membrane of the alimentary canal had a blanched appearance, with only a few rose-coloured spots near the pylorus, and in the large intestines. It is most probable that these

spots were not inflammatory, but what BILLARD calls "rougeur pointillée non inflammatoire." At all events, they were not of a magnitude that could account for the violent and long continued catarrhal affection that afflicted the patient.

There are some very valuable observations on this subject in M. BILLARD'S work "De la Membrane Muqueuse Gastro-Intestinale," at page 358. He mentions there, that it is by no means uncommon to meet with cases, in which there are very abundant dejections of serous fluids, and in which no trace of inflammation can be detected in the mucous membrane of the primae viae, after death. Among other cases, he mentions that of a priest who was attacked with an intestinal flux, and passed different vitiated humours, for the space of thirteen days. He then died; and, upon examining his corpse, no trace of inflammation could be detected in any part of the intestinal canal. He farther mentions, that the same thing is daily met with in the theatres of anatomy; and therefore justly

concludes, that these fluid excretions from the bowels cannot be considered as indications of inflammation of the mucous membrane of the intestines.

In a future part of this Essay I shall have occasion to describe cases of Indian Cholera, in which there was not the slightest appearance of inflammation; but in which the most prominent symptoms were copious vomiting and purging of a sero-mucous secretion. In these cases no traces of inflammation could be detected in the mucous membranes after death; but these membranes, the pulmonary and urinary, as well as the gastro-enteric, were all whiter than natural, and lined with a sero-mucous fluid.

Let us now consider the effects of these two morbid affections, viz. inflammation of mucous membranes and catarrh, on the general system. Their effects on the heart and arteries are very different, and in fact completely opposite. Acute inflammation is accompanied by increased action of the circulation. In slight cases of catarrh of any por-

tion of the mucous membranes, the circulation is scarcely, if at all, affected ; and, in severe cases, both the size of the pulse and heat of the skin are diminished. This is so important in enabling us to explain the etiology of various diseases, that it will be necessary to shew that numerous proofs are not wanting to establish it as a general law.

It has frequently been observed, that simple diarrhoea, which is merely a catarrh of the mucous membrane of the large intestines, is accompanied by a weak small pulse, and a sense of coldness.

A powerful dose of physic, occasioning an abundant secretion from the bowels, is frequently followed by a small pulse, and an unpleasant sensation of coldness over the surface of the body. This was illustrated in a most striking manner in the case of one of my own servants, a young Mahomedan, who took too large a dose of the croton tiglium, which occasioned hypercatharsis. His evacuations, after a time, consisted only of mucus and serum : his pulse was scarcely percepti-



ble at the wrist; his extremities were cold, and his features contracted. He was in this state when I first saw him; and from all these symptoms I immediately concluded that he had an attack of Cholera. When I learned the true nature of his complaint, I gave him 60 drops of laudanum, and he soon recovered.

Simple catarrh of the nose, fauces, and air passages, is always accompanied by a sensation of coldness, and a diminution in the size of the pulse; but the influenza of 1803, which was a severe catarrh, accompanied by inflammation, was denominated a fever, on account of the increased action of the heart and arteries which characterised it.

These proofs, in support of the principle, that catarrh of any part of the mucous membranes occasions a diminution in the size of the pulse and heat of the skin, will at present suffice. Many of a similar nature will doubtless suggest themselves to my readers; and others will be found in the sequel of this Es-

say, where they will have a more appropriate place. Meanwhile we shall endeavour to trace the cause of the phenomenon.

It is an important law of the animal economy, that there is always a determination of blood towards a part whose action is increased. In catarrh, the action of the excretory vessels of a mucous membrane is increased; a determination of blood, therefore, takes place towards them; and there is a consequent diminution of blood towards the surface. The size of the pulse, and heat of the skin, are thereby necessarily diminished. These are frequently referred to debility; but such an explanation is plainly inadmissible; for, in these cases, it is not the action of the vessels, but only the quantity of the blood circulating through them, which is diminished, whereby their calibre becomes contracted. For the confirmation of this view of the subject, we have only to appeal to facts. Great venous congestion is always found in the viscera of the thorax and abdomen of those who have died of catarrhal affections. Were the



smallness of the pulse, in these diseases, owing to debility, we might expect that this smallness should occur, and that the natural fulness should return gradually ; but we invariably find, that the size of the pulse is very rapidly diminished when the secretion of the gastro-enteric mucous membrane is increased, and as rapidly restored to its natural condition upon the secretion being checked. Hence it is clear, that the smallness of the pulse is owing to the blood having been withdrawn from the surface.

The principal reason why an accurate distinction between inflammation and catarrh has not hitherto been made, appears to be, that inflammation of a mucous membrane seldom continues, for any length of time, without exciting catarrh, and that catarrh seldom continues, for any length of time, without exciting inflammation in the membrane in which it is seated. When they occur together, the state of the circulation will of course be modified according to circumstances : it will be increased, if the inflam-

mation predominate, diminished towards the surface, if the catarrh predominate. Accordingly, we find, that, in some cases of dysentery, the pulse continues tolerably full at the wrist, and the skin hot, while, in other cases, the pulse is nearly imperceptible, and the skin cold; the former being those, in which the inflammation, the latter those, in which the secretion, is greater.

Let us now proceed to investigate the mode of action of some of the more active medicines on the gastro-enteric mucous membrane. The following experiments were instituted for the purpose of elucidating this subject. They will also be found to confirm, in a very striking manner, the pathological views which I have proposed in the preceding part of this Essay.

These experiments, together with the observations I have been enabled to make on the subject in my medical practice, lead to the conclusion, that some medicines increase the secretion of the gastro-enteric mucous membrane, at the same time rendering it

white ; and others cause an inflammatory action. I have also observed, that if the action of a stimulating medicine be continued for any length of time upon one spot, it produces inflammation ; whereas a short continuance of its action would only have produced increased secretion.

Before detailing the experiments, I will premise a few observations on the appearances presented by healthy mucous membranes. The following are the results of my observations on the appearances presented by the gastro-enteric mucous membrane of the dog, when in a healthy state. Speaking generally, the gastro-enteric mucous membrane of the dog has a light rose or white colour ; and I have generally found the mucous membrane of the stomach, (especially the cardiac extremity,) and of the large intestines, of a deeper rose colour than that of the other parts of the alimentary canal. When the stomach is filled with food, the colour of its mucous membrane is deeper than when it is empty. When a dog has been killed by hanging, its gastro-

enteric mucous membrane is of a deep rose or purplish colour; these colours being sometimes in patches; and all the veins of the abdominal viscera are much distended. When we wish to examine this membrane, therefore, we ought to kill the animal by decapitation, or by dividing the spinal marrow.

We are told by M. BILLARD, that the healthy colour of the gastro-enteric mucous membrane, in the adult, is white or greyish white; and that in those who die during digestion, the mucous membrane of the stomach, duodenum, and commencement of the jejunum, is of a light rose colour.\* He has shown that the gastro-enteric mucous membrane of individuals who have died of asphyxia from drowning or hanging, exhibits various red and violet colours, which ought to be carefully distinguished from the effects of inflammation, and from the natural condition of the membrane.

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\* Vide De La Membrane Muqueusa Gastro-Intestinale, p. 125.

## EXPERIMENT I.

To a full grown dog were given four grains of tartrate of antimony dissolved in water; which soon produced active and copious vomiting. The dog was immediately decapitated. The stomach had not been completely evacuated. It contained a small quantity of undigested food and fluid. All the left portion of its mucous membrane was perfectly white; towards the pylorus it was of a faint rose colour. The duodenum contained a little mucus tinged with bile; and its mucous membrane was perfectly white. In this case, the medicine appears to have acted principally on the left portion of the stomach, for the contents of the stomach were not completely evacuated. That part of the internal surface of the stomach, on which the medicine had operated, was of a white colour, shewing that, when a mucous membrane has its secretion increased by a stimulating medicine, no inflammatory action is produced.



## EXPERIMENT II.

THREE grains of tartrate of antimony, dissolved in water, were given to a full grown dog. In two or three hours it vomited a quantity of hair and skin matted together, and covered with the secretion of the stomach. Half an hour afterwards the dog was decapitated. The pyloric end of the stomach contained a quantity of hair, like that discharged by vomiting, matted together, and quite undigested; and that part of the mucous membrane of the stomach was of a rose colour. The mucous membrane of the splenic end of the stomach, the contents of which had been removed by vomiting, was perfectly white. This experiment affords another confirmation of the doctrine, that simple increased secretion of a mucous membrane, even when excited by a stimulating medicine, is not necessarily accompanied by an inflammatory action, but, on the other hand, that it renders the membrane white.

## EXPERIMENT III.

A scruple of tartrate of antimony dissolved in water was given to a full grown dog, that had fasted for nearly twenty hours. It soon produced vomiting of a serous and mucous fluid, and afterwards of a white froth. In the course of an hour it also produced purging of a yellowish serous and mucous fluid. The dog was killed about an hour and a half after the tartrate of antimony had been given. The stomach contained a large quantity of a sero-mucous fluid, tinged with bile. Its mucous membrane was perfectly white, except a very small portion in the middle of the large curvature, which had a very slight blush of red. The small and large intestines, throughout their whole extent, contained a considerable quantity of sero-mucous fluid, and their mucous membrane was perfectly white. Not a trace of inflammation could any where be detected.

In June 1826, I gave a scruple of tartrate



of antimony to a patient labouring under an acute pulmonic affection. In half an hour it caused him to vomit a large quantity of serous fluid: shortly afterwards he vomited three yards of a tape-worm, and, in the course of two or three hours, it produced several copious and perfectly watery stools. The size of his pulse was much reduced; his skin became cool and slightly moist, and, in the course of twelve hours, all these symptoms went off, and left him quite well. I afterwards gave similar doses of the medicine to three or four other patients, and in these it invariably produced watery vomiting and purging, coldness of the skin, a small pulse, and general debility.

It would appear, then, that a scruple of tartrate of antimony powerfully increases the secretion of the gastro-enteric mucous membrane, without, at the same time, inducing an inflammatory action. It, consequently, determines the blood towards the abdominal viscera, and thus reduces the size of the pulse and the heat of the skin. These effects it

produced so powerfully, in one of the cases above alluded to, that a person unacquainted with the circumstances of the case might have almost mistaken it for a case of Cholera. This practice, I should think, cannot be always unattended with danger ; for, were the medicine, instead of quickly passing through the alimentary canal, (and thus merely exciting the action of the excretory vessels,) to lodge in any part of them, there can be no doubt that its continued action would excite inflammation.

The above facts shew that the tartrate of antimony has not a direct sedative property, as some maintain. On the contrary, it powerfully excites the secretion of the gastro-enteric mucous membrane ; and the small pulse, cold skin, and debility, are only secondary effects, which go off as soon as the increased secretion is checked.

The experiments of Brodie\* and Magendie,†

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\* Vide Phil. Trans. for 1812, Vol. CII. p. 205.

† Vide ORFILA Traite des Poisons, 5d Edit. p. 458, also 479, *et seq.*

and the observations of various other writers,\* prove that tartrate of antimony frequently produces inflammation of the gastro-enteric mucous membrane. In the experiments of MAGENDIE, in which the inflammation was produced by tartrate of antimony, the oesophagus was tied, so as to prevent vomiting; which shews that the inflammation was produced by the *continued action* of the medicine on the mucous membrane. Other experiments are related by BRODIE, in which large quantities of tartrate of antimony given to dogs produced no inflammation whatever.

The above facts account satisfactorily for the diversity of opinion in regard to the action of tartrate of antimony; for we see that it sometimes produces inflammation, at other times increased secretion, according to the mode of its administration; viz. if its action be continued for some time it will produce the former; if it be made to act suddenly on

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\* Vide BILLARD de la Membrane Muqueuse, p 201, *et seq.*

the gastro-enteric mucous membrane, it will produce the latter effect.

#### EXPERIMENT IV.

Six grains of muriate of mercury, dissolved in water, were given to a dog. This immediately produced active vomiting, which continued till all the contents of the stomach, and a good deal of white froth, had been thrown up. The dog was then killed by having its spinal marrow divided. The stomach was a little contracted, and contained a large quantity of white froth, and its mucous membrane was perfectly white.

#### EXPERIMENT V.

Six grains of muriate of mercury were given to a full grown dog, which produced copious vomiting. The dog remained sixteen hours without food, and was then killed. The

stomach contained a good deal of mucus; and its mucous membrane was perfectly white.

In these two experiments, a powerful stimulant produced only increased secretion from the mucous membrane of the stomach, and thereby rendered it white. Were the action of the same stimulant, however, to be continued for some time on the same spot of a mucous membrane, it would excite inflammation. This the following experiment illustrates.

#### EXPERIMENT VI.

A dog was kept several hours without food. Three grains of muriate of mercury were then given to it; and that there might be less chance of its exciting vomiting, it was not given in solution as in the two former cases, but was made into a bolus with aromatic confection. No vomiting was produced, and after an hour and a half the dog was killed. The stomach contained a little mucus, co-

loured with bile. Its mucous membrane was generally of a brownish-yellow colour, and in some places slightly reddish, and there were three or four small dark red coloured spots. The small intestines contained a few grains of the confection, and a good deal of mucus coloured with bile. Their mucous membrane was generally white; and in the upper part of the duodenum were several small red spots, resembling those in the stomach.

The following experiment was made for the purpose of ascertaining the immediate effects of opium on the gastric mucous membrane.

#### EXPERIMENT VII.

A dog was kept for about twenty hours without food. Four grains of solid opium were then given to him: and four hours afterwards he was decapitated. The greater portion of the stomach, towards the splenic end, was lined with the dissolved opium; and



the mucous membrane was there of a red colour, terminating abruptly towards the pyloric end, which was contracted, with its mucous membrane perfectly white. Not a particle of opium appeared to have entered the small intestines, which contained a very small quantity of healthy mucus, tinged with bile; and their mucous coat was white. Although we may not be able to determine, from this experiment, the precise effects which opium produces on the capillary vessels of the inner coat of the stomach, yet it is evident that they are very different from those produced by tartrate of antimony and corrosive sublimate; for in this experiment, instead of the secretion being increased, and the membrane rendered white, the fluid contained in the stomach was less copious than usual, and the mucous membrane had acquired a red colour.

Let us now enquire into the effects of calomel on mucous membranes, as well as on the general system. Calomel has been employed more extensively than any other me-



dicine in the treatment of Cholera, and in every variety of the disease; but on very different principles by different practitioners. Some have given it merely with the view of exciting the biliary secretion; others under the idea, that it has a specific effect on the stomach and intestines. Some suppose its efficacy to depend entirely on its sialagogue property; and that in this way it cures the disease by a sort of revulsion. Its effects have sometimes been attributed to its equalizing the circulation; sometimes to its supposed sedative property. Its usual action on a mucous membrane is to excite its secretion; and in this case, it renders the membrane white. If, however, its action be continued long on one spot, it gives rise to inflammation. This has been frequently observed in Cholera; spots of inflammation having been observed in those parts of the mucous membrane of the stomach to which the calomel adhered. The increased secretion which it produces is generally of a healthy nature; and, accordingly, we find, that in cases of Cho-

lera and dysentery, when the primae viae must have been previously completely emptied, it frequently occasions an abundant and healthy discharge of feculent matter. In addition to its action on the gastro-enteric mucous membrane, it excites an abundant secretion of bile. In regard to its general action on the system, “ When given in moderate  
 “ quantity, it communicates general vigour :  
 “ it increases the force of the circulation when  
 “ this has become languid ; by the increased  
 “ vascular action which it excites, it gives to  
 “ the blood the disposition to assume the  
 “ buffy coat ; and by its stimulant operation  
 “ on secreting organs, it promotes the secre-  
 “ tions, and hence acts as a general evacuant.”\*

How does it happen, then, that it has been considered by some, when given in scruple doses, to act as a sedative ? This has evidently arisen from its secondary effects only having been taken into consideration ; while its appropriate

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\* MURRAY'S System of Materia Medica, Vol. I. p. 196.

and primary effects have been overlooked. When given in scruple doses in dysentery, it certainly very often cures the patient: but this it does not effect by acting as a sedative. By increasing the force of the circulation towards the surface, and at the same time all the secretions, it relieves the internal vessels; and by exciting a copious and healthy discharge from the enteric mucous membrane, it thereby directly subdues the inflammation.

The great value of calomel, then, in the cure of diseases, consists, first, in its exciting a copious and healthy discharge from the gastro-enteric mucous membrane, without at the same time producing an inflammatory action; secondly, by its increasing the secretion of all the glands, and thereby acting as a general evacuant; and, thirdly, by its permanent and steady stimulant effect on the general system, thereby equalizing the circulation, and thus removing the irritation from the affected part.

## EXPERIMENT VIII

Two drams of calomel, in a little butter, were given to a full grown dog, on an empty stomach. Several hours afterwards it was purged two or three times, but it did not vomit. About twenty hours after the calomel had been given, the dog was decapitated. The mesenteric veins were more distended than natural. A good deal of mucous matter was found lining the inner surface of the stomach. A small quantity of calomel was found in the splenic end of the stomach; and there the mucous membrane was of a rose colour. The pyloric end contained no calomel, and was perfectly white. The gall-bladder was distended with bile. The small intestines contained a good deal of mucus and bile, and their mucous coat was perfectly white. The large intestines were filled with a dark brownish, somewhat feculent matter, and their mucous membrane was of a light rose colour. This experiment illustrates very

well the action of calomel. Part of the calomel remained in the splenic end of the stomach, and there excited an inflammatory action, evinced by the rose colour. In the pyloric end of the stomach and small intestines, where the calomel had not remained, and had only excited an increased secretion, the mucous membrane was perfectly white. In the large intestines, there was a great quantity of dark-coloured secretions, which are so characteristic of the action of calomel; and to the presence of these secretions we must probably attribute the rose colour of the mucous membrane. The large quantity of bile, in the gall-bladder and small intestines, was also clearly owing to the action of the calomel.

The greater number of the above experiments were performed before I had seen Mr ANNESLEY'S works, and the remainder after I had read his paper in the Transactions of the Medical Society of Calcutta. The great vascular turgescence, which was al-



ways observed by Mr ANNESLEY, in the stomach of the dog, is not the natural condition of that organ, but must have been produced, in these cases, by the dogs having been killed by strangulation. At the same time, his experiments afford the same general results as those related above ; for large doses of calomel always increased the secretion of the gastro-enteric mucous membrane, and rendered the internal surface of the stomach lighter in its colour.

Dr JOHNSON'S views of the Pathology of Tropical Diseases have so long influenced the practice of medical men in India, and are, in every point of view, so interesting and important that they deserve a most attentive investigation. His theory principally rests on one grand proposition, viz. that there exists a powerful sympathy between the skin and the liver ;\* that their actions are synchronous, and indeed so much so, that the

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\* Vide The Influence of Tropical Climates, &c. 2d Edit.  
p. 13.



state of the one may always serve as an index to that of the other. Now, I would ask any medical man what he has observed in regard to this in practice? I am confident he will answer that the biliary secretion is often increased when the perspiration is diminished, and *vice versa*. How often do we observe in fevers, that the skin continues parched and dry, while, at the same time, the patient passes immense quantities of bile, and does not feel relieved until the increased flow of bile ceases and the perspiration returns. The same thing happens in Cholera Morbus. This disease is characterised, at first, by hot and dry skin, and bilious vomiting and purging; and the patient is only relieved from his sufferings when the biliary secretion diminishes and the cuticular bursts forth. On the other hand, in the epidemic or Indian Cholera, there is frequently profuse perspiration, and, at the same time not a trace of bile in any part of the alimentary canal. Examples of this kind might be multiplied, but these are sufficient

to shew that the cuticular and biliary secretions are by no means synchronous.

The state of the biliary secretion is very much influenced by the condition of the mucous membrane of the stomach and small intestines. It is well known that the state of the secretion of any gland depends, in a considerable degree, upon that of the mucous membrane on whose surface the secretion is discharged. Irritation of the tunica adnata of the eye increases the flow of the tears; the presence of food in the mouth increases the salivary secretion; irritation of the glans occasions a rapid secretion of the seminal fluid; when a sound irritates the internal surface of the bladder, the flow of urine is increased; and, in the same way, the presence of stimuli in the duodenum causes an increased flow of bile.\* Such being the case, we may reasonably conclude, that, when the functions of mucous membranes are deranged, a consequent derangement in the functions of the

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\* Vide BICHAT *Traité des Membranes*.

glands, whose excretory ducts open on their surface, will also occur.

Some kinds of ophthalmia are accompanied simply by an increased secretion of tears; others by an increased and vitiated secretion. It has been shewn by Messrs LERMINIER and ANDRAL, from extensive observations made in the Hopital de la Charité in Paris, that inflammation of the enteric mucous membrane induces an abundant secretion of bile.\* In the seventh case, in Mr ABERNETHY's Observations on the Constitutional Origin and Treatment of Local Complaints, we have an instance of how much the biliary secretion may be deranged by a diseased state of the mucous membrane of the small intestines. A young woman was admitted into St Bartholemew's Hospital with a number of anomalous symptoms, such as occasional inability to move her limbs, attacks resembling epileptic paroxysms, &c. and, among other symptoms, great derangement of the biliary secre-

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\* Clinique Medicale, Vol. I. p. 375.

tion. She was attacked with fever, and died. On dissection, no morbid appearances could any where be discovered, except an ulcerated state of the villous coat of the ileum, near to its termination in the coecum, and slight inflammation of the internal coat of the large intestines. “The liver was healthy in its structure. In the gall-bladder, about an ounce and a half of light green serous fluid was found, which had not, in the least degree, the soapy or mucagenous feel of bile.” Besides demonstrating how much the biliary secretion may be affected by a diseased state of the mucous membrane of the intestines, this case also shews us what important and varied symptoms may originate in a slightly diseased state of a portion of the enteric mucous membrane, unaccompanied by local pain.

Do not cases frequently occur in India, which are considered to be, and are treated as liver complaints; and in which the disordered state of that gland is only a consequence of the principal disease, viz. a derangement of

the functions, or an actual organic disease of the mucous membrane of the intestines ?

When we find, on the dissection of a subject who had died of dysentery, the greater portion of the enteric mucous membrane diseased, and the liver healthy, (and this I have frequently seen,) is it not reasonable to conclude, that the functional derangement of the liver, during life, was the effect of the disease of the mucous membrane ? No person would think of referring ophthalmia to the disordered action of the lachrymal gland which occasionally occurs in that disease. Why then should we refer dysentery to a disordered action of the biliary gland, especially when we know that this disordered action is not an invariable occurrence in dysentery ?

Exactly the same reasoning will apply to the state of the liver in Cholera.

In order that some of the more important conclusions, to which I have been led by the preceding facts and reasonings, may be kept more distinctly in view during our future investigations, I will here recapitulate them.



1. Mucous membranes are liable to two distinct simple morbid affections, viz. inflammation and catarrh.

2. Catarrh consists of a diseased action of the secretory apparatus of a mucous membrane, which produces an increased and vitiated secretion; and is characterised by the membrane in which it occurs being generally whiter than natural, and by the quantity of the blood towards the surface of the body being diminished.

3. Either of these morbid affections may occur alone in a mucous membrane, or conjoined with the other.

4. Some medicines produce an inflammatory, others a catarrhal action, in mucous membranes; and a long continued action of certain medicines produces the former, while a short continued action of the same medicines produces the latter effect.

5. There is no direct sympathy between the skin and liver; and the action of the liver and many other glands is much influenced by the condition of the mucous membrane upon which their excretory ducts open.



## AUTOPSY OF CHOLERA.

IT is a prevalent opinion, that no *post mortem* appearances have been observed in Cholera which could enable us to infer what were the diseased actions that existed during life, and that constituted the disease. I apprehend, however, that in many dissections the examination of the various important parts of the body has been very partial;\* and

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\* A medical friend once told me, that he had opened the bodies of several subjects who had died of Cholera ; but that he had found no morbid appearances that could account for the disease. Upon asking him whether he had examined the mucous membranes carefully, he told me that in no case had he thought of looking at any one of them. This plainly shews that the autopsy of Cholera has not received that degree of attention which it deserves. We sometimes find it stated in the relation of cases, that no morbid appearances could be detected on dissection, sufficient to account for the death of the patient ; but if the mucous membranes, and perhaps also other important organs, were not examined, of what use is such an observation ?

that the nature of some of the morbid appearances has been misunderstood.

It is much to be wondered at, that, in all the observations that have been published on the pathology of Cholera, so little weight has been given to the disordered condition of the mucous membranes, which forms an invariable character of the disease. This appears the more surprising, when we consider the importance of the mucous membranes in the animal economy; their very great extent; their great sensibility; the numerous sympathies that exist between them and every other part of the body; the many instances in which their diseases have become epidemic; and the invariable derangement of all, or at least of some portions of them, in Cholera.

Although many medical men have accurately described the various appearances of the secretion thrown out by the stomach and intestines in Cholera, they have very seldom extended their observations to the diseased action of the gastro-enteric mucous mem-

brane by which these secretions are produced. A very common, and perhaps a natural prejudice, inclines us to consider the intestinal tube merely as a conduit for the passage of excrementitious and peccant matters, and that all kinds of fluxes are only efforts of this tube to rid the bowels of diseased substances, the presence of which is prejudicial to health. Farther, there appears to be a disinclination, with many pathologists, to admit that the gastro-enteric mucous membrane is ever the seat of the pathological cause of a disease. Hence it is, that Cholera Morbus has been referred to the irritation of diseased bile, diarrhoea to diseased matters irritating the intestines, and Indian Cholera and dysentery to disordered states of the liver, of the brain, nervous system, &c. &c. It is certain that Cholera was not considered to be a disease, *sui generis*, until it occurred as an epidemic. Previous to that period it was generally denominated flux; and by the natives of India it is simply denominated vomiting and purging. Under these names, it is a disease that has

been well known at very distant periods and places. But as soon as it became epidemic, its name was altered, and its nature confounded. The discovery of its pathological cause was considered by many to be impossible; and those who did theorize upon it referred it to almost every diseased condition of the human frame, except that to which it had formerly and frequently been attributed.

The morbid appearances that are *invariably* met with in Cholera are confined to the mucous system; those observed in other systems being only occasional. In all the dissections I have made, the following appearances have been present. A whitish, opaque, viscid substance was found adhering to the surface of some portions of the mucous membranes; and in many cases it was so abundant in the intestines as completely to fill parts of them of a greater or smaller extent. The stomach and portions of the intestines were filled with a transparent or turbid serous fluid; and, frequently, the viscid matter mentioned above was found intimately mixed with the serous

fluid, or floating in it in the form of flakes. The mucous membranes (except when inflamed) had an unnatural whiteness ; were frequently soft and pulpy ; and in general (especially in the stomach and small intestines) could be easily detached by scraping, in the form of a thick pulp, from the subjacent coat. These appearances were sometimes more or less partial ; but some of them were generally found throughout the whole extent of the alimentary canal. They extended, in some cases, to the mucous membrane of the bladder and ureters ; and were found, in two or three instances, in the pulmonary mucous membrane.

Many cases have been related, in which the secretion from the gastro-enteric mucous membrane exhibited appearances different from those mentioned above. It has been met with of a dark grey or green colour, sometimes bloody, and occasionally of the consistence and colour of cream. It has been shewn by Mr ANNESLEY that the dark grey and green colours are owing to the chemical



action of calomel and bile on the Cholera secretion; and they cannot be considered, therefore, as constituting separate varieties of the secretion. The creamy matter I have met with in two or three cases; and in these it had very much the appearance of pus. The bloody variety I have never seen. It is very rare; and probably arises from accidental circumstances.

The morbid appearances that have been found next in frequency to those already mentioned, are, venous congestion in the viscera, particularly in those of the abdomen; dark-coloured blood in the veins, and sometimes in the left side of the heart; and inflammation in some part of the mucous membranes. I have generally found inflammation (when present at all) confined to the pyloric extremity of the stomach and small intestines. I have also met with many cases in which no inflammation could be detected.

The red colours which are frequently met with in different parts of the mucous membranes, in Cholera, are not always to be attri-



buted to inflammation. They are generally owing to congestion; which may be ascertained by strictly observing the other appearances which accompany them.\* Some of the cases so accurately described by Mr ANNESLEY, in his *Sketches of the Diseases of India*, afford excellent examples of redness of the mucous membranes produced by congestion.

The following are the appearances I have observed in the blood drawn by venaesection, or by leeches, from Cholera patients. Sometimes it has been perfectly black, of the consistence of liquid honey, or forming a uniform coagulum after a few minutes exposure to the air; and these appearances it has retained for twenty-four hours, without separating into serum and crassamentum. In some cases it has been darker than usual, and has not become fluid after many hours exposure to the air; but has coagulated and separated a good deal of serum. I have observed it of the usual dark colour, with red streaks; and

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\* Vide Case IX. in the Appendix.

these streaks appeared to increase in some instances as the bleeding was continued; and, lastly, I have seen it quite natural, except perhaps being a little darker than usual when first drawn.\*

All the other morbid appearances that have been observed by different practitioners have been only occasional.

From a careful examination of the Cholera secretion, procured from the stomach and intestines of several individuals that died of the disease, I found that it has the following chemical characters and composition. It does not affect litmus or turmeric papers. It becomes of a dark grey colour when mixed with calomel. It consists of two substances: the one a transparent serous fluid, the other an opaque white coagulum. The former is perfectly soluble in cold water, which enables us easily to separate it from the latter, which is

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\* It is worthy of remark, that black-coloured blood is not peculiar to Cholera. I have seen blood, taken from rheumatic and dysenteric patients, in India, continue black for many hours after it was drawn.

quite insoluble. This separation (which indeed often takes place spontaneously, the coagulum being often found diffused in the form of flakes in the serous fluid,) may be considered the first step towards the analysis of the secretion; in the same way that the coagulation and separation of the crassamentum form the first step towards ascertaining the nature of blood.

The following experiments were made on the two substances taken separately.\*

#### 1. SEROUS FLUID.

- a.* Tincture of galls produced a precipitate, when added to a mixture of the serous fluid with cold water.
- b.* Alcohol produced a precipitate when added to the same mixture.
- c.* Muriate of mercury produced a white precipitate.

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\* These experiments were performed two or three times with the same results.

- d.* Sulphuric acid produced a white precipitate.
- e.* It was coagulated by heat.
- f.* It did not affect litmus paper.

## 2. COAGULATED MATTER.

- a.* Insoluble in cold water.
- b.* Slightly soluble in boiling water.
- c.* Dissolved when boiled in acetic acid.
- d.* Dissolved by pure aqua ammoniae.
- e.* Not changed when triturated with calomel.
- f.* Prussiate of potassa, when added to the solution *c*, produced a copious yellow precipitate.

The first set of these experiments proves, that the fluid part of the secretion is pure serum, which is particularly confirmed by *d* and *e*. The second set proves, that the coagulated part of the secretion is fibrin; test *f* being that which, according to Berzelius, particularly distinguishes that substance. The secretion, therefore, has a composition similar to

that of blood, deprived of its colouring matter; but the proportions of the serum and fibrin in the secretion are, I imagine, seldom the same as those we find in blood; for, in most cases of Cholera, there is an enormous quantity of the serum thrown out by the stomach and intestines, with only a small quantity of coagulated matter.

We must conclude from these experiments, that the Cholera secretion is not merely an increased natural secretion of the mucous membranes, but that while this is increased it is also vitiated; and that it does not originate in an inverted action of the lacteals, as some have conjectured; for, independent of its being very abundant in the stomach and large intestines, where there are few or no lacteals, it has very little resemblance to chyle. The circumstance of its not affecting vegetable colours, proves that there is no free acid in the secretion; and thereby shews that Dr AINSLIE'S views of the disease cannot be maintained.

The turbid appearance which the serous fluid sometimes has, and the different colours

which the secretion occasionally exhibits, ought not to be considered as constituting separate varieties ; for in all probability they are owing entirely to the admixture of calomel and other medicines given for the cure of the disease. The creamy or purulent-like matter, mentioned above, probably differs little from the more common cholera secretion, except in the proportion of its constituent parts. It has a perfectly homogeneous appearance. From a great portion of it not being soluble in cold water, and being precipitated from its solution in acetic acid by prussiate of potassa, it may be inferred, that, like the more common secretion, it contains fibrin.

That the disordered state of the mucous membrane is not a partial occurrence, but is invariably present in Cholera, is a fact that rests on the very best evidence, viz. on that of MR SCOT, who mentions it at page 34 of his Report on the Epidemic. “ We have “ seen,” says he, “ that serous membranes, “ are not necessarily affected in Cholera, “ but that mucous membranes, including



“ the skin, which is of an analogous nature,  
“ are affected, and that this affection is  
“ in some part or other invariable.” And,  
again, he says, “ The affections of the skin  
“ and mucous membranes of the body in Cho-  
“ lera are evidenced by a cold, relaxed condi-  
“ tion in the former ; and in the latter, by the  
“ state of the stomach and intestines, from all  
“ of which a watery or mucous discharge is  
“ largely poured out ; and by the state of the  
“ bladder and ureters, which are found to be  
“ coated with a mucus similar to that which  
“ is observed in the other passages. The  
“ fluid discharged at times from the bladder is  
“ almost always stated to be limpid, colour-  
“ less, and in small quantity, leading to the in-  
“ ference, that it may not be urine, but a mere  
“ watery exudation from the lining mem-  
“ brane. That the mucous membranes are  
“ affected, is farther evidenced by the moist  
“ state of the mouth, even under the most  
“ urgent thirst ; and by the state of the eyes,  
“ where there appears to be a peculiar secre-  
“ tion, or exudation, in the form of a film.”

Many cases have been recorded in which we find it stated, that on examination no morbid appearances could be detected. But, in these cases, were the mucous membranes carefully examined? From what has been stated in a former page, we have every reason to suspect they were not. Even if they were carefully examined, and no morbid appearances could be discovered, we are not the less certain that their *functions* were disordered during life; for of this the copious morbid secretions thrown off by vomiting and stool; afford a sufficient proof. It is stated in case eighth in the Bengal Report on the Epidemic Cholera, that no morbid appearances could be discovered on dissection: yet even supposing this dissection to have been made with the greatest care, it is perfectly evident that there was great functional derangement of the gastro-enteric mucous membrane during life; for the most prominent symptoms were frequent vomiting and purging.

The catarrhal affection has its seat generally, I think, in the stomach and small intes-

tines ; and in almost all severe and protracted cases, it appears to pervade every mucous membrane of the body.\* The stomach is certainly most obnoxious to the disease ; and I have met with no case in which it was free from it. I imagine that the mucous membrane of the air passages is not *always* affected ; but it frequently is so, and perhaps invariably in severe cases.

For some time, believing the stomach and intestines to be the only seats of the disease, I unfortunately overlooked the condition of the pulmonary mucous membrane ; and since my attention has been directed towards the latter, I have had it in my power, only two or three times, to ascertain the state of that

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\* It has been observed by BICHAT, that the various epidemic catarrhs described by authors have been generally characterized by the disorder being confined to the gastro-pulmonary membrane, the genito-urinary remaining unaffected. Cholera, however, forms an exception to this general rule ; for in it the catarrhal affection frequently extends (as observed in the text) to every mucous membrane of the body,

membrane by dissection. The first of the cases alluded to was that of an old man, a convict, who died of Cholera after an illness of about ten hours. The symptoms were frequent watery purging, collapsed features, gradual diminution in the size of the pulse, coldness of the extremities, and difficulty of breathing. Having been attacked with the disease during the night, and not having reported his illness till the morning, the remedies came too late, and the disease proved fatal. The usual morbid appearances were found in the gastro-enteric mucous membrane, with little venous congestion in the abdomen, and no inflammation. The trachea was lined with a thickish mucus; and the minute branches of the bronchia were completely filled with a white froth. The second case being in many respects extremely interesting, and the dissection having been made with great care in the presence of a medical friend, I will relate it in detail.

*15th June 1826.*—ANOMAH, male convict,

aged 20, was brought into hospital about half past five, P. M. from Moogud, a village five miles from Darwar.

6, P. M.—It is reported that he vomited and was purged two or three times early this morning; but he himself positively asserts that he neither vomited nor was purged. When interrogated, he complains of nothing but slight pains in his limbs. His intellect is perfectly clear; and although he is weak, he has a perfect command over all his voluntary muscles. Features considerably collapsed; pulse not perceptible at the wrist or temples; no perspiration on any part of the body; hands and feet cold; tongue coated, whitish, and moist.

Sumat statim Submur. Hydrarg. ℥i et superbibat  
tincturae cardamomi ℥i in paululo aquae tepidae.  
Admoveantur sinapismi pedibus et cruribus, em-  
plastrum epispasticum forte abdomini et arena  
calida brachiis.

7, P. M.—Has taken two doses of the calomel and tincture of cardamoms. Says he feels a little better. Skin colder since last report. Features much collapsed. Complains of



slight pain in his knees, and of pain from the cataplasms. Answers all questions most distinctly.

Sumat Submur. Hydrargyr. gr. v. necnon Tinct.  
Cardamom ℥iij. in paululo aquae tepidae quaque  
semihora.

9, P. M.—Has taken four doses of the calomel and tincture of cardamoms. Is restless, and complains of thirst. Pain in the umbilical region on pressure. Pain in his knees continues. Skin cold, with a slight cold perspiration. No pulse at the wrist or temples.

*Continuantur remedia.*

10, P. M.—Has coughed up a quantity of white froth. In other respects the same.

He died about midnight; and the body was examined at six o'clock of the following morning.

*Abdomen.*—Stomach distended, with its external surface natural. Small intestines considerably distended, and of a purplish colour. Large intestines, in some places distended, in



others much contracted, with their external surface natural. The stomach contained a large quantity of whitish muddy fluid. Its mucous coat was lined with a white coagulum, and exhibited a blush of red near the pylorus. The duodenum contained a large quantity of a white turbid serum, and a large lumbriciis : Its mucous coat was of a white colour, and was lined with a whitish mucus throughout its whole extent. The jejunum and ileum contained a large quantity of serous fluid, mixed with flakes of a white coagulum. Their mucous membrane had a light vermilion colour, and was lined with a white coagulum. The large intestines contained a considerable quantity of turbid serous fluid. The mucous membrane of the coecum, and greater part of the colon, had a reddish colour, and was lined with a diaphanous mucus. The lower part of the colon and rectum were healthy. The liver was healthy in its structure, with more blood than usual in its veins. The gall-bladder contained healthy, and somewhat inspissated bile. The urinary bladder was healthy.

*Thorax.*—Heart natural. Blood dark coloured. Structure of the lungs healthy. A quantity of white froth was found in the trachea. *The bronchia were filled with a white froth, and a large quantity of a grey serous fluid mixed with white flakes.*

*Encephalon.*—Considerable congestion in all the meningeal veins. All the contents of the cranium were, in other respects, healthy.

I will leave this case, without any remarks upon it at present, as it has been related here only with the view of shewing that the catarrhal affection in Cholera sometimes extends to the pulmonary membrane as well as to the mucous membranes of the other viscera.

I have been able to gain no information, on this subject, from any dissections that have been already made public, except in one instance. Mr R. H. ENGLAND, Assistant-Surgeon, in a report to the Madras Medical Board in 1821, mentions that, “ *on cutting into the lungs, a grey fluid oozed from the divided places.*” This grey fluid could, of

course, be nothing but a secretion from the mucous membrane of the air passages and cells ; and as the remark is a general one, and not confined to any particular case, we must conclude that it was an invariable, or, at least, a very common appearance.

These instances, then, are sufficient to prove that the catarrhal affection frequently extends to the pulmonary mucous membrane, as well as to the other mucous membranes of the body.

The skin also frequently participates in the diseased action of the mucous membranes ; for in many cases we find it covered with a cold clammy sweat, or with a profuse perspiration. If, with BICHAT, we view the mucous membranes and the skin merely as different portions of one continuous surface, the functions of which are analagous, we may consider the vitiated perspiration in Cholera merely as the effect of the same morbid action, which in different cases extends to every part of this extensive membranous tegument, external as well as internal.

## RATIO SYMPTOMATUM OF CHOLERA.

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THE greater number of cases of Cholera that have been recorded, and these by men professing different and opposite theories, state the first symptoms to have been a sense of uneasiness at the epigastrium, vomiting and purging ; and that these symptoms often continued a long time before any others made their appearance. It often happens that a patient ejects a large quantity of mucous and serous fluids by vomiting and stool, when at the same time his circulation is not much disturbed, and there are no other symptoms (except, perhaps, anxiety) to indicate the presence of Cholera. No one, however, doubts of the identity of the disease ; and the practitioner does not hesitate to treat it *secundum artem*. Now, in such a case, I would ask,

what has become of the deficiency of nervous power, or of the diminished energy of the nervous system? What has become of the congestion of the veins of the viscera, or of the torpor of the extreme vessels of the liver? or, lastly, What symptoms have we, in such a case, of inflammation of the brain, or of the spinal marrow, of the stomach, or, in fact, of any part of the body?

To say that any disease is owing to diminished nervous energy is, I conceive, only using a peculiar phraseology, instead of furnishing a scientific explanation of symptoms. No one will say that he knows any thing of diminished nervous energy, except by its effects. Many, however, conclude, from the existence of certain phenomena, that there is such a thing as diminished nervous energy; and, the next moment, they turn round, and have recourse to it for the explanation of the very phenomena from which its existence was at first deduced.

But it appears to me that we can with less propriety attribute Cholera to diminished



energy of the nervous system, than almost any other disease with which we are acquainted; for, in Cholera, the external senses, the voluntary, and some involuntary motions, continue, in a large proportion of cases, unimpaired; and one of the most important and extensive secretions, viz. that of the mucous membranes, far from being diminished, is always prodigiously increased. Even the other secretions are not invariably diminished; and when they are so, we can easily perceive that it does not arise from any defect of the nervous system, but from a deficiency of the circulating fluid, which has been withdrawn from these organs, and determined towards the mucous membranes—the seat of increased action.

On this subject there is the following strong passage, at page 205 of the 84th number of the Edinburgh Medical and Surgical Journal.

“ Of what disease, we ask, might it not be  
 “ predicated, that it consists in a diminution  
 “ of the energy of the nervous system? What  
 “ disease is there, in the long list of the Noso-



“logy, in which the energy of the nervous  
 “system is not diminished? Is it more re-  
 “markably or more exclusively diminished in  
 “Cholera than in any other? The second  
 “proposition of Mr ORTON, ‘That the depra-  
 “vation of nervous influence thus produced  
 “extends to all the functions, and immediate-  
 “ly produces the disease,’ is a complete as-  
 “sumption, unsupported by any proof, evi-  
 “dence, or any plausible pretext whatever;  
 “and to it also belongs the great merit of be-  
 “ing equally applicable to any disease with  
 “which the human frame may be afflicted.  
 “According to the mode of reasoning adopt-  
 “ed by Mr ORTON, there is no disease of  
 “which it may not be said, after you have  
 “shewn that the deprivation of nervous in-  
 “fluence thus produced extends to all the  
 “functions, that it *does* immediately produce  
 “the phenomena of the disease.”

It is curious that the abundant secretions,  
 thrown out by the mucous membranes in  
 Cholera, should have been referred by some  
 to debility. This opinion has apparently ari-

sen from the circumstance of food having frequently been found undigested in the stomach after death. But how could the food be digested when there was no healthy gastric juice for this purpose, and when the stomach was filled with depraved secretions? Moreover, the fluids thrown out by mucous membranes are furnished, not by exhalation, but by secretion; and it is difficult to imagine how *increased secretion* could arise from *debility of the secreting organ*.

A disordered state of the bowels, very much resembling Cholera, has frequently been observed to arise from a powerful dose of physic: and, during its prevalence, a strong dose of a saline purgative has been by no means an unfrequent exciting cause of the disease. It has also been frequently observed, that Cholera often commences with an insidious diarrhoea, without the presence of any other symptom. These, I think, are pretty strong proofs that this variety of Cholera is really a catarrh of the mucous membrane of the primae viae.

## CASES.

DURING the prevalence of Cholera at Darwar in 1826, a Sepoy of the 5th regiment of Native Infantry was brought into hospital at 7, A. M. of the 10th of May. He said he had been attacked with purging early in the morning, when on guard at the jail; that the first evacuations had been natural, but that the two or three last were like rice water, which made him apprehend that he was about to have an attack of Cholera. His pulse and skin were natural. His tongue was clean; and he had no other symptom of the disease. He took fifty drops of laudanum and a strong dose of calomel and jalap, which soon produced several healthy evacuations, in other words, restored the healthy action of the enteric mucous membrane; and he had no return of the disease.

Next morning another Sepoy, who had been on guard at the jail, was brought into hospital

with frequent white watery purging. All the other functions were natural. He took a doze of physic and some laudanum, which soon restored the healthy action of his bowels; and in the evening he was so well that he intended to return to his duty next morning. During the night, however, or rather early in the morning, he took a large draught of cold water and some butter-milk, which occasioned a renewal of the purging. When I saw him at 6 o'clock, A. M. he had been purged frequently, and had vomited two or three times: his evacuations being watery, with a few white flakes. His features were considerably collapsed; his pulse at the wrist extremely small. He had already taken fifty minims of laudanum. I immediately opened a vein in his arm, from which very dark-coloured blood flowed sluggishly in a small stream, or in drops. The bleeding was continued until I procured 30 ounces, when the blood became lighter coloured, his features brightened up, and he expressed himself much relieved. He coughed two or three times, and appeared to

breathe more freely than he had done before. The disease, however, had not been overcome; for although his pulse had considerably improved, it was far from being of its natural fulness; he vomited once, and was purged two or three times. A strong blister was therefore applied to his abdomen, and sinapisms to his legs and feet: and during the day he took several scruple doses of calomel, with camphor mixture, and liquor ammoniacae. He slept a little during the night; next day had two or three feculent evacuations; and speedily recovered.

These two cases very clearly point out the nature of the disease. In the first case, and on the first day of the second case, there was evidently nothing more than catarrh of the enteric mucous membrane, and which was easily overcome by simple remedies. In the latter part of the second case there was the same catarrh of the enteric mucous membrane, but increased in severity; extending to the gastric membrane; occasioning the characteristic symptoms of Cholera; and requir-



ing for its cure, the active remedies usually employed in that disease.

The following passage, forcibly illustrating this subject, is taken from one of Mr R. H. ENGLAND'S Reports to the Madras Medical Board. " I have frequently" (says he) " detected Sepoys round an encampment, with  
 " diarrhoea, unattended with vomiting, pain,  
 " or any other unusual symptom. This state,  
 " I have the strongest proofs to convince me,  
 " was the commencement of the Cholera, as a  
 " few of these cases terminated fatally, with  
 " the usual symptoms of the disease. After  
 " a diarrhoea had existed several hours, I have  
 " in many cases found it resist every kind of  
 " remedy; the purging continued; the vas-  
 " cular action became impaired; prostration  
 " of strength ensued; and the patient sunk  
 " without any considerable pain. I have often  
 " asked these persons, why they did not apply  
 " to me earlier; and the general answer was,  
 " that as they found no great inconvenience  
 " from the diarrhoea, they deemed it unne-  
 " cessary and improper to make a report of a



“circumstance so apparently trifling.” Mr ORTON, in his *Essay on Cholera*, says, “This epidemic has frequently been observed to begin with a common diarrhoea, which has gradually assumed the form of Cholera, so as to occasion a great difficulty in the diagnosis in the early stages.” Similar observations have been made by numerous other medical men, which shew, that the term Cholera is, with general consent, often applied to a simple catarrh of the mucous membrane of the intestines, without any other symptom whatever being present.

I am aware it may be objected to the view I have taken of the subject, that in many cases of Cholera there has been neither vomiting nor purging. I will shew, however, that the catarrhal affection of the mucuous membrane is not only present in such cases, but is even sometimes greater than in those cases in which vomiting and purging are most urgent. I have opened the bodies of patients, in whom the symptom of vomiting had been entirely wanting, and found the stomach fil-

led with serous fluid, and its inner surface lined with a white coagulum.

#### CASE.

SHAIK EBRAM, a convict, aged 36, when at work in the open air, on the 9th of May, was attacked with purging, at 2 P. M. He was brought into hospital at half-past four o'clock; up to which time he had been purged only four times, and had not vomited once. He was weak. He exhibited no signs of pain or uneasiness; and although unwilling to be roused, was perfectly sensible. No pulse at his wrist; features collapsed; skin cool. Spasms did not occur throughout the case, except a slight twitch, of short duration, in the muscles of the loins.

It is unnecessary to give a minute detail of the treatment. Suffice it to say, that I attempted to bleed him from the arm and temporal artery, but could only procure an ounce of dark-coloured blood from the former. He took two scruple doses of calomel, some tinc-

ture of cardamoms, kyaputty oil, and camphor mixture. Boiling water was applied to the belly, and sinapisms to the legs and feet ; but nothing was of the slightest avail. He died at six o'clock.

His body was examined on the same evening, a few hours after his death, and presented the following appearances :

Considerable congestion of the veins of the stomach and mesentery. *The stomach contained a very large quantity of serous fluid, and a small quantity of food ; and its mucous coat was white, lined with coagulated fibrin,\* and exhibited a little redness near the pylorus.* The intestines were in many places contracted. They contained a large quantity of white and transparent serous fluids ; and their mucous membrane was lined with a white coagulated fibrin throughout its whole extent. The liver was healthy. The gall-bladder contained healthy bile. Considerable congestion of the

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\* The secretions in this case were examined chemically, and afforded the results already stated.

meningeal veins. No inflammation in any of the contents of the cranium. The tuber annulare, and upper part of the spinal marrow, were healthy.

About the same time another convict died of Cholera, who had no vomiting ; and in his stomach I found a larger quantity of the coagulated secretion than I had ever observed in any other case. Thus we see, that although there be no vomiting, there is, nevertheless, a severe catarrh of gastric-mucous membrane. The same observation, I am convinced, will hold good, respecting the state of the enteric mucous membrane, as connected with purging. Mr SCOT, at page 13 of his Report on the Epidemic Cholera, says, “In cases where  
 “ little or no purging has taken place during  
 “ life, the intestines have yet been found, af-  
 “ ter death, to be filled with the congee-like  
 “ matter, as if they wanted energy to throw  
 “ it off, or as if a stricture had been formed  
 “ on the lower portion of the gut.” Indeed, the case of SHAIK EBRAM also, to a certain extent, proves the same thing ; for in it the

purging was very trifling, and the quantity of diseased secretions in the intestines was very great. But this case is still farther useful, by shewing what an immense quantity of the diseased secretion may be thrown out by the mucous membranes in a very short time; and also, that these diseased secretions are sometimes the only morbid appearance of any consequence in Cholera.

Although it may be allowed that catarrh of the mucous membranes is always present in Cholera, it will probably be contended by some that it is not the pathological cause of the disease, but the effect of the determination of the blood towards the viscera. That such is not the case, however, appears sufficiently evident from the following considerations. First, the catarrh is not partial, but extends frequently to every mucous membrane of the body, even to that which lines the anterior part of the eyes; secondly, it is often the first morbid phenomenon that makes its appearance, and occurs long before there is any determination of blood to the interior parts.



The simplest, although the most dangerous form of Cholera, is that which consists of an extensive catarrh of the mucous membranes, without inflammation. This, in the manner already explained, occasions a determination of blood to the interior, and a consequent diminution of the blood towards the surface. It is accompanied by no pain, and, in fact, is only characterized by an increased and vitiated secretion from the mucous membranes, cold skin, and smallness or loss of pulse towards the surface.

The disease has, in some instances, been known to prove fatal in a very short time ; it is said, even within the course of a few minutes. This may at first sight appear somewhat inconsistent with the view I have taken of its pathological cause. But it is quite conceivable that a violent catarrh, suddenly affecting a great part of the mucous membranes, might, by the rapidity of its attack, give so violent a shock to the system as to occasion sudden death.

Cholera is generally described as being ac-



accompanied by great debility of the circulating system. This, I suspect, is not strictly correct; for although a small pulse is almost an invariable symptom of the disease, it is by no means a proof of arterial debility; but merely that the quantity of blood circulating through the vessel has been diminished. It is thus conceivable how an artery, though containing a smaller quantity of blood than usual, may have its action actually increased. Were the smallness of the pulse owing to general debility of the circulating system, we might expect it to arise more gradually, and to continue longer after the removal of the disease, than we find to be the case in Cholera. A person enjoying good health is attacked with the disease: His pulse becomes rapidly smaller; His features collapse from diminution of blood; and if the disease prove fatal, the blood is found accumulated in the internal vessels. Should he recover, the pulse immediately regains its fulness, and sometimes has its action much increased. These facts naturally lead to the conclusion,

that the smallness of the pulse is not owing to debility; but only to the circumstance of the blood having been withdrawn from the surface and determined to the interior.

Profuse perspiration is a very common symptom of Cholera. It is a curious fact, that there is sometimes a copious perspiration when the pulse at the wrist is extremely small, or altogether imperceptible. This has generally been considered as indicative of extreme debility of the cuticular perspiratory vessels. On the other hand, I am inclined to think, that these vessels have their action very much increased; for were the reverse the case, how does it happen that, when only a small quantity of blood flows sluggishly, or in drops, from a large orifice made in a vein, or even when no blood can be procured, the cuticular secretion forces its way through the minute pores of the skin? It is easily conceivable how debility of the perspiratory vessels can occasion increased perspiration, when the superficial arteries which are immediately behind them act with vigour; but when

these arteries do not contain a sufficient quantity of blood to enable them to continue their own action, the only way in which perspiration can be thrown out is evidently by an increased action of the perspiratory vessels. But perspiration is by no means an invariable symptom of Cholera; for, in some cases, there is only a slight moisture about the face and hands; and, in others, the whole skin is perfectly dry.

The increased perspiration may be supposed to be the effect of sympathy between the skin and mucous membranes; but I think the more correct view of the subject is that, in which it is considered merely as a part of the morbid action which constitutes the disease; and as an action similar to that which exists in the mucous membranes. The skin is a continuation of the mucous membranes, and very much resembles them in its structure and functions. It is, therefore, not to be wondered at that the disordered action which affects all the mucous

membranes should, in some instances, extend also to the skin.

The peculiar morbid condition of the blood, in Cholera, is one of the most curious and interesting features of the disease. But this morbid condition is not the same in every case, nor indeed is it an invariable symptom in the first stage of the disease.\* It is evident, therefore, that it cannot be the pathological cause of the disease, as some have conjectured; and, farther, the cause, or causes, by which it is produced, cannot be uniform.

I do not even consider it as a good diagnostic symptom of the disease; for, as stated above, it is by no means invariable in the first stage, when an accurate diagnosis is of the greatest consequence; and a similar state of the blood is by no means infrequent in other diseases in India. I have observed it in cases of dysentery, fever, and even in rheumatism.

The black colour of the blood is probably owing to its not being decarbonized in its

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\* Vide page 50.

passage through the lungs; the air being prevented from acting upon it by the diseased secretion thrown out by the pulmonary mucous membrane. It might be objected to this view of the subject, that frequently the dark colour of the blood occurs soon after the commencement of the disease, when we could hardly expect an accumulation of mucous secretion to have taken place, sufficient to prevent the entrance of the air into the air cells; and farther, that in the latter stages of the disease, there often appears to be no mechanical obstruction to respiration. It is extremely probable, however, that the disordered state of the delicate membrane lining the air cells, is of itself sufficient to prevent the chemical action of the air on the blood from taking place; and it is evident that the smallest quantity of a viscid secretion lining the air cells will effectually prevent the decarbonization of the blood, without materially obstructing the process of respiration. But, in whatever way we may account for it, we must admit the fact that the usual chemical changes



between the atmospheric air and the blood, do not take place in Cholera ; for of this, the cold breath, and the fact established by Dr DAVY, that the air expired by Cholera patients contains less carbonic acid than usual, are sufficient proofs.

We have still to account for the other morbid appearances of the blood. Were it merely not decarbonized, without any other change in its nature, we might expect it to become florid ; to coagulate ; and to separate into serum and crassamentum, on exposure to the atmosphere. But, in many cases, it never loses its black colour, remaining perfectly fluid ; or if it does coagulate, it separates no serum. All these appearances must be ultimately referred to the disorder of the mucous membranes ; although we may find it difficult to explain *how* this disorder gives rise to these effects. That such important changes in the constitution of the blood should be occasioned by an extensive catarrhal affection of the mucous membranes, will not be matter of surprise, when it is considered how great a



change is produced in the blood even by a slight inflammation. These views are farther confirmed by the fact, that “ in Enteritis, “ in the affection of the alimentary canal induced by some poisons, and in the simplest “ of all irritating causes, rupture or other mechanical injury of that canal, a state of the “ circulation is induced which approaches very “ closely to that observed in the Eastern Cholera.”\* May not the thick state and rapid coagulation of the blood in some cases of Cholera, be occasioned by the prodigious quantity of serum which is sometimes thrown out by the mucous membranes? And may not the watery state of the blood, in other cases, arise from the secretion of the mucous membranes, consisting principally of fibrinous matter?

A very distressing symptom, which *occasionally* occurs in Cholera, is difficulty of breathing. It is plainly to be attributed to the obstruction of the minute bronchia by their diseased secretion. It cannot be referred

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\* Fdin. Medical and Surgical Journal, No. 86. p. 180.

to spasm, for it often occurs in cases in which spasms are entirely wanting. The stethoscope might afford us some assistance in the diagnosis of this part of the disease.

Coldness of the skin, which is one of the most characteristic symptoms of Cholera in its advanced stage, is clearly owing to two causes; *1st*, To the diminution in the quantity of blood sent towards the surface; *2dly*, To the usual changes not being effected in the blood in its passage through the lungs.

Debility of the voluntary muscles is almost an invariable symptom of Cholera; but in many cases it is by no means so great as we might be led to expect from the very extensive diseased condition of the mucous membranes. Sometimes when the pulse is scarcely perceptible at the wrist, the patient is still able to walk; and long after the pulse has ceased at the wrist, (although perhaps not able to move about,) he is often sufficiently strong to sit up, to use his arms and hands, to speak, &c.

When we consider the great diminution of

muscular power that is sometimes occasioned by simple vomiting, by a diarrhoea, or by a large dose of tartrate of antimony, we cannot be surprised at the great debility that often occurs in Cholera: and the only cause of astonishment is, that this debility is not invariable. This, however, in concurrence with the perfect state of sensation, clearly shows, that the debility of the muscles is not owing to diminished energy of the nervous system. A person is attacked with Cholera; the blood gradually leaves the surface, which, as might be expected, occasions more or less muscular debility; his mental faculties, however, remain undisturbed;\* all the external senses continue perfect; and, in fact, almost all the functions of the nervous system are for a long time unimpaired; until, near the fatal termination, they become affected by the great derangement of the circulation.

In some cases of Cholera, anxiety and an

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\* Vide ANNESLEY'S Sketches of the Diseases of India, p. 21; also ANOMAH'S Case, p. 58, and the Cases in the Appendix.

overpowering sensation at the praecordium, generally denominated sinking, are very distressing symptoms. The latter is, most probably, only a variety of the former, from which it appears principally to differ in being more severe. Both may be attributed either to the disordered state of the stomach, or of the lungs; sometimes, perhaps, they are referable to the one, sometimes to the other.

If, in addition to the catarrhal affection, inflammation be present in the mucous membranes, the symptoms of the disease will of course be more or less modified. If the inflammation be not very violent or extensive, it will probably be indicated only by local pain or burning, or perhaps merely by pain on pressure. If it be great, it will excite the action of the general circulation.

Frequently pain in the abdomen does not occur until a late stage of the disease; and in these cases, is probably owing to inflammation. It has been observed by several medical men, that calomel is often found adhering in patches to the inner surface of the stomach of those

who had died of Cholera, and that in these places only was there inflammation. In several cases I have found appearances of inflammation in the pyloric extremity of the stomach, where the stimulating medicines given for the cure of the disease were collected. It would appear, therefore, that inflammation is sometimes occasioned solely by the violent remedies used for the cure of the disease.

It is a curious feature of many cases of Cholera, that there is great thirst, while the mouth, at the same time, is perfectly moist. It is, however, by no means an invariable symptom; and I am inclined to think, that it is generally owing to inflammation being conjoined to the catarrhal affection of the stomach; for it is found to be most urgent in cases where there is great pain at the *præcordium*.

Cholera Morbus is accompanied by increased action of the circulation, hot dry skin, &c. In it, therefore, instead of catarrh, there ought to be, (consistently with the above principles,) acute inflammation of the mucous



membrane of the primae viae. All the cases of Cholera Morbus that I have met with have terminated favourably. Authors who have described the *post mortem* appearances in this disease, generally state, that marks of inflammation were found in the mucous membrane of the primae viae. But the symptoms of inflammation of the gastro-enteric mucous membrane are so well marked during life, that we hardly require more positive proof of its presence. To what else can we refer the burning at the epigastrium, pain of the abdomen, especially on pressure, heat of skin, quick hard pulse, &c. ? Moreover, the vomiting and purging in Cholera Morbus are very different in their nature from those which occur in the catarrhal form of the disease ; for they never contain the vitiated mucous secretions that characterise the latter. The abundant discharges of bile also strengthen our conclusion, that there is inflammation of the gastro-enteric mucous membrane ; for it has been shewn in a former page,\* that inflammation of this

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\* Page 59.



membrane increases the secretion of the bile.

That Cholera Morbus consists of an inflammation of the gastro-enteric mucous membrane, may appear questionable, from the circumstance of its generally making its attack, and running its course very rapidly. But if we pay a little attention to the subject, we shall find that this is easily accounted for. It is not more sudden in its attack than some other inflammations; and the following considerations shew, that the rapidity of its course is exactly what we might be led to expect from the nature of the disease. If the mucous membrane of the primae viae be suddenly affected with inflammation, a rapid congestion in the viscera is induced, and death within a few hours is consequently the result. But since this membrane is itself a secreting organ, a local evacuation may be produced from its extensive surface, whereby the inflammation is quickly subdued, congestion prevented, and the patient at once restored to health.

Spasms are, by no means, invariable symp-

toms of Indian Cholera; and, from what I have seen in my own practice, I am inclined to think that they seldom occur, except when there is inflammation of some part of the mucous membranes. From a review of the cases recorded by others, I think I have observed that spasms were most severe in those cases that were most inflammatory, and absent from those that consisted of the simple catarrh.

When we consider what violent spasms arise from comparatively trifling irritation of the primae viae, we cannot be surprised at their frequent occurrence in Cholera. The absence of spasms, in those cases in which there is only catarrh of the mucous membranes without inflammation, is quite consistent with what we know of the nature of catarrh; for it never directly produces any sensible effect on the nervous system.

All the other symptoms which occasionally occur in Cholera are of minor importance, and do not require to be taken into account in a general view of the pathology of the dis-

ease. It is necessary, however, to advert, in a general manner, to those affections which arise from accumulation of blood in the head, such as apparent coma, tinnitus aurium, deafness, &c. ; for to this accumulation some have referred the proximate cause of the disease. But far from its being the proximate cause, it is by no means a general occurrence ; and in no case does it occur until the latter stages of the disease, and until after all the other symptoms have been developed.

If the preceding pathological views be found to be correct, it will follow, that there are two essentially distinct kinds of Cholera ; one, the disease usually denominated Cholera Morbus, or Cholera Biliosa, consisting of an inflammation of the gastro-enteric mucous membrane ; the other, the Indian Cholera, or Cholera Asphyxia of SCOT, consisting of a violent catarrh of the mucous membranes generally ; and farther, that cases sometimes occur of a mixed nature, from catarrh and inflammation being present in the mucous membranes at the same time. Should these views be adopt-

ed, the correct designations of the two principal species of Cholera would be *Cholera Pyretica*, and *Cholera Catarrhalis*, the former being the Cholera Morbus, the latter the epidemic Cholera, Cholera Asphyxia of SCOT, and Cholera Spasmodica of some other authors.\*

We have seen that all the various symptoms of Indian Cholera may be traced to a general catarrhal affection of the mucous system ; and that this morbid condition is invariably the first link of the chain of morbid phenomena which constitutes the disease. But from the prevailing propensity of our

\* Consistently with these principles, Cholera may perhaps be considered objectionable as a generic term. But if (instead of deriving it from  $\chiολη$ , *bilis*) we adopt the derivation of TRALLIAN,\* CASTELLUS,† and others, viz. of  $\chiολας$ , *intestinum*, the term will then bear the accurate signification of intestinal flux ; and to which the above terms Pyretica and Catarrhalis will serve as appropriate specific adjuncts.

\* Vide Good's Study of Medicine, 2d Edit. Vol. I. p. 260.

† Nomen habet non tam a  $\chiολη$ , quam a  $\chiολας$ , i. e. *intestinum*, per quod Materia ex ventre excernitur. BERTHOLOMAEI CASTELLI Lexicon Medicum.—Lipsiae, 1713.

medical theorists, to refer all diseases to some hidden cause, it is probable that, even after admitting the general accuracy of our investigation, some may feel inclined to probe the subject a little farther, and to refer the disorder of the mucous membranes, as well as all its consecutive train of symptoms, to some mysterious cause connected with the nervous energy or vital principle. This would be pushing our research beyond its due limits, and would be found not only to prove futile, but even pernicious; for we have still to learn what the vital principle and nervous energy are. It would be of little advantage to us, to be told, that Cholera is owing to an immaterial something, which can never be cognizable by our senses; and the properties of which are therefore perfectly unknown to us.

Resting satisfied, therefore, with the results of our present enquiry, and holding the catarrh of the mucous system to be the proximate cause of the disease, we ought next to proceed to enquire into the nature of those external causes by which this catarrh is pro-



duced. Researches, much more accurate and extensive than have hitherto been bestowed upon this subject, would be necessary for its investigation ; and without pretending, therefore, to remove the obscurity in which it is still enveloped, I will only add a few remarks which are naturally suggested by our previous discussions.

Endeavours to discover the causes of epidemics have generally been unsuccessful ; but the investigation of the causes of endemics, and of sporadical cases of disease, is attended with much less difficulty, and is often quite satisfactory. Every one knows the causes of catarrh in this country ; yet it is difficult to assign a reason for this disease having become epidemic in 1803. Although, therefore, there is little chance of our discovering the causes of the Epidemic Cholera, we may nevertheless endeavour, and with some chance of success, to ascertain the causes of endemial and sporadical cases of the disease.

It is allowed by every one, (whatever may be his pathological creed,) that common ca-



tarrh, diarrhoea, dysentery, and Cholera Morbus are occasioned by changes in the temperature and moisture of the atmosphere ; and it is not considered subversive of this opinion, that these diseases occasionally occur as epidemics, or that their causes cannot be sometimes accurately traced.

Indian Cholera, which in many respects resembles these diseases, also bears a striking analogy to them in its mode of production ; for although its causes, when it occurred as an epidemic, are still hid in obscurity, it has been very generally remarked, that sporadical cases arise from atmospherical vicissitudes. It is generally most prevalent during changeable weather, and ceases when the weather becomes serene and temperate. For several years it has prevailed in the Southern Mahratta country in the months of April, May, and June, when the diurnal range of temperature is great, and there are considerable changes in the hygrometric state of the atmosphere. Several instances have been known of its having ceased on the occurrence of a

thunder-storm ;\* and our sensations alone teach us what a great effect a thunder-storm has in equalizing the temperature and moisture of the air. It usually makes its attack during the night, or early in the morning, especially if the individual has been fatigued during the day : and it is notorious, that it is most prevalent among troops when marching ; for they then undergo more fatigue, and are more exposed to the cold night air than usual. In these respects, then, it strongly resembles catarrh, diarrhoea, and dysentery. But it is also excited by a different set of causes, viz. by such as, instead of acting on the skin, are applied directly to the mucous membrane of the primae viae. Thus, it has often arisen from a large dose of salts : unripe fruit has been known to cause it ; and it has very often been induced by a

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\* I witnessed a remarkable instance of this at Kulladghee in 1824. After the disease had prevailed for several weeks in the troop of Horse Artillery, there was a violent thunder-storm ; after which not a single case occurred.

large draught of cold water, butter-milk, &c. Its causes, then, may be said to be such as excite a catarrh in the mucous membranes, especially in those of the *primae viae*.

Thus far we find the investigation comparatively simple; but when we would endeavour to ascertain *how* the causes above mentioned produce the disease, we find ourselves beset with difficulties. But these difficulties equally belong to other diseases; and we require a more extensive acquaintance with the laws of the animal economy than we at present possess, to enable us to overcome them. And it may afford us a sort of satisfaction to reflect, that we are as well acquainted with the causes of Cholera as we are with those of many other diseases with which we are familiar, such as common catarrh, diarrhoea, and dysentery; and, therefore, that there is really nothing more mysterious in this disease than there is in any other with which the human frame is afflicted.

TREATMENT OF CHOLERA.

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THE great value of a correct knowledge of the pathology of a disease, consists in its making us acquainted with those morbid conditions, the removal of which will restore the body to health. If, then, the preceding views be correct, we have gained a most important desideratum. We know what those morbid conditions are in Cholera, against which our remedies must be directed, and the removal of which must form the grand object of our treatment. Accordingly, in the Catarrhal Cholera, there will always be two principal indications of cure, viz. to remove the diseased action of the mucous membranes, and to restore the circulation of the blood towards the surface. The first will always be present; the second only after the disease has made some progress, and in all severe cases. But in order to effect these indications, we

shall require to employ different means under different circumstances ; and to vary our remedies according as certain symptoms predominate or are wanting. We cannot expect, therefore, to discover any remedy or specific that will be applicable in all cases ; and it is clear that there is just as much necessity for a practitioner to exercise his judgment in treating this as in treating any other disease in the whole range of the Nosology.

It is almost universally admitted, that blood-letting is one of the most powerful remedies we possess in the treatment of Cholera. But I think that it is even more extensively applicable than is usually admitted. I conceive that it is not only indicated in the case of the robust and plethoric European, but also in that of the most delicate native. It ought not only to be put in practice in cases accompanied by increased action of the circulation, but even in every case when blood can be obtained, however much its quantity may have been diminished towards the surface ; except only in those cases in



which there had been great debility previous to the attack of the disease.

The *modus medendi* of blood-letting in Cholera Morbus is sufficiently evident. The pathological cause of the disease being an inflammation of the gastro-enteric mucous membrane, the bleeding will remove this inflammation, in the same way as it removes that of any other texture; and the cause being removed, of course all the symptoms will disappear.

In the Catarrhal or Indian Cholera, in which there is a determination of blood towards the viscera, blood-letting appears to act in the following way: It relieves the catarrhal affection of the mucous membranes, by diminishing increased action; and it restores the circulation of the blood towards the surface. How it produces the latter effect, is, in the present state of our knowledge, not very evident; but that it does so is a fact, and that is sufficient. It has been observed that blood-letting in Cholera frequently removes the dark colour of the blood; which must be owing to

its removing the causes of this dark colour, viz. the catarrhal affection of the pulmonary and gastro-enteric mucous membranes.

Blisters and sinapisms are among the most beneficial, and certainly the safest remedies, that can be employed in Cholera. Their mode of action is quite evident, from what has been said concerning the pathology of the disease. It has long been proverbial in medicine, that there is always a determination of blood towards a part which is stimulated. By stimulating the skin, therefore, by epispastics and rubifacients, we restore the circulation of the blood towards the periphery, and thereby relieve the internal vessels; and consequently moderate the diseased action of the secretory apparatus of the mucous membranes.

I generally apply a strong cantharides plaster to the abdomen, and sometimes to the chest; cataplasms of mustard and capsicums, to the feet and legs; and hot sand, or friction, to the arms and hands. It is, I think, only in extreme cases that we ought to have recourse to boiling water or acid, for the pur-

pose of raising a blister ; for, when there is sufficient time to admit of a blister being raised by means of a plaster, the constant stimulus which it keeps up appears to be more effectual in occasioning a steady determination towards the surface than the sudden and violent stimulus of either of the former.\* However, in two or three almost hopeless cases, I have seen the boiling water blister attended with the most favourable results. One of these was the case of a native woman in Darwar, who had been ill the greater part of the night. Her friends did not apply to me for medicines till nine o'clock in the morning. She then had no pulse at her wrist ; her features were collapsed, and her skin cold. I ordered the boiling water to be applied immediately to the abdomen, and that she should have a little tincture of capsicums in some warm water. This was done. The circulation returned to the surface ; and before the evening she was free from the disease.

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\* Vide ORTON'S Essay on Cholera, p. 418.

By far the most difficult part of the treatment of Cholera, is the management of general stimulants.\* Most of these medicines that have been used in Cholera, may, in certain cases, when judiciously employed, be productive of benefit; but there can be no doubt that they have often done harm. It is, therefore, an object of the very first importance to ascertain the principles that ought to guide us in the exhibition of them.

The action of general stimulants may be considered under two points of view; first, in regard to their effects on the gastro-enteric mucous membrane; secondly, in regard to their general effects on the system. The latter, from being the most manifest, have almost always obtained the greatest share of attention: but they are not always the most important; for, it is not improbable, that

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\* By general stimulants are here to be understood narcotics, antispasmodics, tonics, and astringents—Vide MURRAY'S System of Materia Medica, Vol. I.

they are often merely symptomatic of the former. In most cases of Cholera we must principally attend to the former; the first indication of cure being to restore the healthy action of the gastro-enteric mucous membrane.\*

Opium has been almost invariably extolled in the treatment of Cholera. The primary effect of opium is that of a diffusible stimulant. It also diminishes irritability, represses the secretions, and moderates inordinate actions. These properties point it out as a medicine well adapted to the catarrhal form of Cholera. The objects we ought to propose to ourselves in its administration, are, to suppress the vomiting and purging; to diminish the depraved secretions of the mucous membranes; to alleviate spasms, and to assist in restoring the circulation of the blood towards the surface. In the inflammatory Cholera, it is only admissible for the pur-

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\* For the local action of stimulants on the mucous membranes, I must refer to the first part of this essay.



pose of allaying the vomiting ; for, if continued beyond this, it would tend to increase the inflammation. Cases in which there is only catarrh of the mucous membranes, are those in which it may be used with the greatest freedom. Where inflammation is present, it must, of course, be employed with more caution. It ought, I conceive, never to be used solely for the purpose of removing spasms ; for, spasms being merely symptomatic of the disease of the mucous membranes, they will most certainly cease when the latter is removed.

Alcohol, aether, and the different stimulating tinctures, somewhat resemble opium in their general mode of action, excepting that their stimulus is more permanent. They are especially indicated in the latter stages of the disease, when they can be retained on the stomach, and when the quantity of blood is much diminished towards the surface. They are counter-indicated by pain and burning in any part of the abdomen, which they always aggravate.

The aromatic and warm vegetable substances, which have been employed in Cholera, produce a slight inflammatory action on the gastro-enteric mucous membrane, and appear to exert little or no general influence on the system. They are clearly inadmissible, except in the purely catarrhal form of the disease; and then they probably promote the cure, by repressing the increased secretion of the mucous membranes, by means of the inflammatory action they induce. They may be used in combination with other remedies, such as alcohol, with calomel and purgatives; but, if given alone, I think it doubtful whether they would prove of any utility. Bitters are the most useful of the vegetable tonics that can be employed in Cholera; for they generally possess an astringent property, whereby they repress the increased secretion of the stomach and intestines.

Calomel is certainly one of the most extensively useful remedies we possess for the treatment of this as well as of various other tropical diseases. From what has been said

of the action of calomel, in the first part of this Essay, it might at first sight appear, that since it increases the secretion of the gastro-enteric mucous membrane, it will be inadmissible in the catarrhal form of Cholera. But it must be remembered, that while it increases the secretion, it also restores it to a healthy condition. Accordingly, when Cholera has been cured by calomel, the looseness, to a certain extent continues ; but then the evacuations are feculent, yellow, or of a dark colour. The combination of calomel and opium, which has been so much extolled, appears to be a remedy admirably calculated for fulfilling the intentions of cure in the catarrhal form of Cholera ; for the requisite properties wanting in the one medicine are supplied by the other. Thus calomel keeps up a permanent stimulant effect on the system, which opium does not. Opium represses the abundant discharge from the gastro-enteric mucous membrane, while calomel corrects it. Lastly, calomel increases the peristaltic motion of the bowels, and thus effects the discharge of vi-

tiated secretions, while opium relieves irritation.

In the inflammatory form of Cholera, calomel will act with greatest effect when given alone, or combined with a purgative; for our object, in this instance, is to remove inflammation, and to excite a healthy increased secretion in the mucous membrane of the primae viae. Even in the catarrhal form of the disease, where there is little or no peristaltic motion in the bowels, calomel may be beneficially combined with stimulating cathartics; for in such a case, when given without them, it sometimes remains in the stomach and upper parts of the intestines, and there excites inflammation. When given along with other remedies, warm cathartics are not likely to do harm. They occasion a healthy action in the secretory apparatus of the primae viae, and by exciting the peristaltic motion they cause the other medicines to pass along, and be applied to all parts of the gastro-enteric mucous membrane.

Fumigation with mercury might, I think, be employed with very good effect in Cholera. A simple and effectual method of employing mercurial fumigation was recommended by the late Dr GIBSON of the Bombay Establishment. A scruple of blue pill is mixed with a little cow dung, and made into a pyramidal shaped mass, which is dried in the sun. The patient is placed in a sitting posture on the floor, under two or three cumlies;\* and the mass having been placed on the floor, within the cumlies, is set fire to. It soon produces a copious perspiration, and a few applications are generally sufficient to occasion ptyalism. In Cholera, the patient, instead of being seated on the floor, might lie on a country cot, as recommended by Mr DALTON, for the application of spiritous vapour. This remedy would possess the double benefit of raising the heat of the body, and of quickly affecting the system with mercury; while, at the same time, it would not be liable to the objection

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\* Native Blankets.



attending the vapour bath, viz. of giving rise to a great degree of moisture.

In cases where there is much oppression of breathing, and in which the catarrhal affection appears to have extended to the pulmonary mucous membrane, the inhaling a medicated vapour, or a gas, might prove a useful remedy; but of this I cannot speak from experience.

Glysters may be very beneficially employed for the purpose of introducing medicines into the large intestines, calculated to restore the healthy action of their mucous membranes, and to excite the peristaltic motion of the bowels, when that is deficient.

Cold drinks are clearly counter-indicated in the Catarrhal Cholera; for there can be no doubt that cold always aggravates, and frequently excites, catarrh;\* and, moreover, we ought to endeavour, by every means in our power, to restore the natural temperature of the body. There appears to be no reason for

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\* Vide Case at page 70.

withholding tepid drinks from a patient labouring under Cholera; and, in fact, their free use is strongly indicated by many of the symptoms of the disease. They will communicate warmth, diminish thirst, and tend to alleviate the different distressing sensations which may be referred to inflammation of the gastric mucous membrane.

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## APPENDIX.

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IT would be tedious, and of little utility, to relate *numerous* Cases, by way of example, of all the varied appearances that Cholera assumes ; and, accordingly, the few following Cases are merely related with the view of illustrating the doctrines contained in this Essay, not of advocating the plan of treatment that has been employed in *all* of them ; for some of them occurred before I had acquired my present views of the nature of the disease.

The two following cases of Cholera Morbus occurred in May 1823, in a detachment of European Artillerymen, proceeding from St Thomas's Mount to Hydrabad, and of which I had medical charge. The weather was then oppressively hot, the thermometer rising at noon every day, in a subaltern's tent, as high as 108° and 110°, and its greatest depression, which was always a little before sun-rise, being never lower than from 86° to 90°. The most prevalent diseases in the detachment were bilious fever and acute dysentery.

## CASE I.

*Nellore, 16th May 1823.*

—— BURNS, *Gunner*, aet. 35.—Is a sober man, and has enjoyed very good health since he left St Thomas's Mount.—4, P. M.—Was exposed a good deal to the sun to-day. About two hours ago, he was attacked with vomiting and purging of a green bilious matter. Complains of severe pain and burning at the epigastrium, spasmodic pains in his bowels, and intense thirst. Severe spasms occur, at short intervals, in the calves of his legs; pulse 100, full and hard; tongue furred, dry; skin warm; countenance anxious.

Emittantur sanguinis e brachio ℥xxiv.

℞ Calomel. ʒi.

Opium gr. i. Misce ft. bolus stat. sumend.

℞ Tinct. Opii ℥ss.

Ol. Olivar. ℥i. Misce ft. Embrocatio qua perfri-  
cetur abdomen.

17th, *Mane*.—Was much relieved by the bleeding. No vomiting or purging since last report. The pain

and burning at the epigastrium, and the spasms, gradually ceased. Had a small green-coloured stool, this morning, and complains of pain in his bowels. Pulse natural. Tongue furred.

Sumat stat. Sulphat. Magnes.  $\zeta$ i.

The salts operated freely, and he got completely rid of the complaint. It was succeeded, however, by a diarrhoea, which soon yielded to opium and epicacuan.

## CASE II.

*Coduganoor, 17th May 1823.*

—— HARRIS, *Gunner*, aet. 40.— $2\frac{1}{2}$ , P. M.— Exposed himself a good deal to the sun this forenoon. Was attacked, about half an hour ago, with purging, which, he says, was at first feculent, afterwards watery, bilious, and slimy. Complains of severe pain and burning at the epigastrium, spasmodic pain in his bowels, intense thirst and nausea. No vomiting. Violent spasms occur occasionally in his extremities, and sometimes in his back. Pulse 100, full, and hard. Countenance anxious, and expressive of great pain. Tongue furred, dry. Skin hot and dry.



Emitt. Sanguinis e brachio ℥xxxvi.

℞ Calomel. ʒi.

Opium gr. i. Misce ft. bolus stat. sumend.

℞ Tinct. Opii ℥ss.

Ol. Oliva. ℥i. Misce ft. Embrocatio qua perfricatur abdomen.

6, P. M.—He was almost immediately relieved by the bleeding. Complains now only of weakness and thirst. Is perspiring.

Habeat aquam oryzae tepidam pro potu.

On the 18th, he had slight dysenteric symptoms, which, however, were easily removed, and he soon recovered.

The following are Cases of the Catarrhal Cholera.

### CASE III.

*Dharwar, 14th May 1825.*

LINGAH, *Male Convict*, aet. 22.—Was admitted into hospital at 5, A. M. with frequent vomiting and purging. His evacuations consisted of a greenish-coloured serum, in which floated a number of white flakes. Features collapsed; hands and feet cold; pulse extremely

small. Complained of no pain or uneasiness. Took several doses of laudanum, several five-grain doses of calomel, and some pepper-water. Hot sand was applied to his hands and feet, and a blister to his belly. He sunk rapidly, and died at 11, A. M.

*Dissection.*—Peritoneal coat of the intestines of a rose colour. Mesenteric veins not larger than usual. The mucous membrane of the stomach and intestines appeared thicker than usual; was pulpy; easily lacerated; and was lined with a thick, white, adhesive mucus. Liver natural, but contained a good deal of dark-coloured blood. Gall-bladder contained healthy bile. Dark-coloured blood in the left cavities of the heart. Brain not examined.

#### CASE IV.

*Dharwar, 15th May 1825.*

ROYAPAH, *Male Convict*, aet. 29.—6, A. M. Was attacked very early this morning with severe vomiting of a whitish watery fluid. Has vomited four or five times since he came into hospital. No purging. Is very restless. Pulse quick, and very small. Extremities cold. Countenance anxious. Complains of thirst.

Emitt. sanguinis e brachio ℥xvi.

Capiat Calomel. gr. v. quaque semi-hora.

Capiat stat. Tinct. Opii gr. xv.

Admoveantur empl. epispast. abdomini, et arena calida manibus et pedibus.

Habeat subinde paululum infusionis Piper. Nigri tepidae pro potu.

5, P. M.—Two veins were opened, from which fourteen ounces of dark-coloured blood were procured. No vomiting since he took the laudanum. Has taken five doses of the calomel. Bowels not yet moved. Pulse very small. Skin cold.

℞ Calomel.

Extract. Colocynth. comp. ā ā gr. x. Misce ft. bolus stat. sumend.

16th, 7, A. M.—Feels much better. Has had two watery yellow stools. Pulse continues small. Hands and feet cold.

℞ Infus. Quassiae ℥ij.

Alcohol, dilut. ℥ss. M. ter in die sumend.

17th, Convalescent.

## CASE V.

*Dharwar, 17th June 1826.*

NURSUMLOO, aet. 25, *Sepoy*, 5th Regiment N. I.—  
6½. A. M. Was attacked with vomiting about four  
o'clock this morning; but it appeared to him of so  
trifling a nature, that he delayed coming to the hospi-  
tal till now. Features much collapsed. Is very weak.  
Pulse thready, scarcely perceptible at the wrist. Ex-  
tremities cold. Tongue clean.

Emitt. sanguinis e brachio ℥xxx.

Sumat. stat. Calomel ℥i; et superbibat paululum  
mist. Camph. in aqua tepida. Admoveantur empl.  
epispast. validum abdomini et thoraci; sinapismi  
pedibus, et arena calida brachiis.

7½, A. M.—His pulse ceased at the wrist a few mi-  
nutes after last report. Only two or three ounces of  
thick dark-coloured blood could be procured from his  
arm. He vomited a large quantity of serous fluid mix-  
ed with white flakes; immediately after which another  
scruple of calomel, a dram of laudanum, two drams of  
tincture of cardamoms, and some warm water, were  
given to him, which remained on his stomach. Features

much collapsed. No pain, not even in the abdomen on pressure. Extremities cold. No pulse at the wrist or temples.

℞ Calomel. gr. v.

Tinct. Cardamomi ℥ij.

Aquae tepidae ℥ij. Misce ft. haust.

Stat. sumend. et repetend. quaque semi-hora.

℞ Infus. Sennae ℥vi.

Ol. Ricini ℥i.

Tinct. Cardamomi ℥ij. Misce ft. Enema stat. injiciend.

2, P. M.—The enema brought away nothing except a lumbricus. He has taken the calomel and tincture of cardamoms nearly every half hour. No pulse at the wrist or temples. Skin very cold.

Omit med.

Habeat infus. Piper. Nigri pro potu.

18th, 6, A. M.—Has taken nothing since last report, except a little pepper-water. Features still much collapsed. Pulse just perceptible at the wrist. Skin a little warmer. The blister has begun to take effect. Had several watery brownish stools during the night; and made water freely this morning. Has just now had a very scanty stool of thick mucus tinged with blood.

℞ Ol. Ricini ℥ij,

Aquae tepidae ℥xii. Misce ft. Enema stat. injiciend.

6, P. M.—The enema came away a few minutes after it was administered, and brought nothing along with it. Has had no other evacuation since last report. Features still considerably collapsed. Pulse somewhat improved. Skin warmer.

Habeat aquam oryzae pro potu.

19th, 6, P. M.—Slept a good deal last night, and has continued easy all day. Had two grey-coloured evacuations last night; and two dark green, rather consistent evacuations, this forenoon. The blister has risen a little. Pulse and features improved. Extremities rather cold.

℞ Infus. Quassiae ℥ij.

Tinct. Cardamomi ℥ij. Misce ter in die sumend.

20th, *Mane*.—Has had one dark-greenish coloured stool since last report. Slept well during the night. Features much improved. Pulse natural. Skin warm. Mouth slightly affected by the calomel.

21st, Convalescent.



## CASE VI.

*Dharwar, 17th June 1826.*

VYAPOORY, aet. 20, *Sepoy*, 5th Regiment, N. I.—Has been in hospital since the 15th inst. with an ulcer on the leg.

2, P. M.—Reported to the dresser about half an hour ago, that he had vomited two or three times a large quantity of white watery fluid; but that, excepting weakness, nothing else was the matter with him. His illness had not even attracted the notice of the other patients in the ward. Pulse already imperceptible at the wrist. Features collapsed. Extremities cold. No perspiration. Has taken 50 minims of laudanum.

Sumat stat. Calomel. ʒi et superbibat Tinct. Cardamomi ʒss, in paululum Aquae Piperit. tepidae. Admoveantur empl. epispast. validum abdomini, sinapismi pedibus et arena calida brachiis.

18th, 6, A. M.—In addition to the medicines prescribed above, he took ten grains of compound extract of colocynth yesterday evening. His pulse began to be perceptible last night at ten o'clock, and is now just perceptible at the wrist. Skin a little warmer. Had two watery yellow stools yesterday evening.

℞. Calomel.

Extract. Colocynth. comp.  $\bar{a} \bar{a}$  gr. x. Miscce, ft. bolus stat. sumend. et superbibat Tinct. Cardamomi  $\bar{z}$ ss. in paul. aquae tepidae.

6, P. M.—Has had five or six yellow watery stools since he took the calomel and colocynth. The blister has not yet taken effect. Pulse much improved. Skin warmer.

Habeat aquam oryzae tepidam pro potu ad libitum.

19th, 6, A. M.—Slept pretty well during the night. No evacuation since last report. Complains only of weakness. Features much improved. Pulse tolerably good. Skin warm.

Sumat infus. Quassiae  $\bar{z}$ ij. ter in die.

20th, Convalescent.

## CASE VII.

*Dharwar, 23d August 1826.*

MUDDRY MOOTOO, *Male Convict*, aet. 45.—Was brought into hospital this morning with a bowel complaint.

5½ P. M.—He reported to the dresser, about an hour ago, that he had vomited once, and had been purged two or three times since the morning. Evacuations white and watery. A blister was immediately applied

to his abdomen, sinapisms to his legs and feet, and hot sand to his arms. A scruple of calomel was given to him, and was washed down with a little tincture of cardamoms and warm water; but was retained a very short time. Another scruple was therefore given, with 35 drops of laudanum. At present, features collapsed; skin very cold, dry; pulse small; tongue covered with a white coating; complains of no pain or uneasiness; intellect clear.

Emitt. sanguinis e brachio ℥xxx.

℞. Calomel. ℥ij.

Extract. Colocynth. Comp. gr. x.

Misce ft. bolus stat. sumend. et superbibat Tinct.

Cardamomi ℥ss. in aquae tepidae ℥ij.

6½ P. M.—About ten ounces of dark-coloured blood, streaked with red, have been procured. Continues quiet. Suffers no pain. Complains of thirst. Pulse scarcely perceptible at the wrist. Breathing slow, and scarcely perceptible. No vomiting or purging.

℞. Ol. Ricini ℥ij.

Tinct. Cardamomi ℥ss.

Aquae tepidae ℥xij. Misce, ft. enema stat. injiciend. Habeat aquam oryzae ad libitum.

10½ P. M.—Thirteen ounces of blood were procured.

It has separated into serum and crassamentum ; the latter of which continues dark-coloured. Had two copious white watery stools, after having had the enema. Skin cold. Pulse indistinctly perceptible at the wrist.

Rep. Enema.

R̄. Tinct. Cardamomi ℥ss.

Aquae tepidae ℥i. Misce ; omni hora sumend.

11½ p. m.—Has vomited a quantity of white watery fluid. Skin very cold, and somewhat moist. Pulse thready. Complains of thirst.

R̄. Calomel. ℥i et superbibat Tinct. Opii gtt. xxv. in aqua tepida.

24th, 7. A. M.—Has had two watery dark grey coloured stools. Skin cold and dry. Pulse just perceptible at the wrist. No pain. Intellect clear. The blister has not taken effect, but occasions a burning sensation.

Admoveatur sinapism. pectori.

Rep. Enema.

25th, 7. A. M.—Had one yellow watery stool yesterday, and one nearly natural stool this morning. The blister has risen pretty well. Pulse natural. Tongue cleaner. No thirst.

26th, Convalescent.

## CASE VIII.

*Dharwar, 3d September 1826.*

BEEMA, *Male Convict*, aet. 18.—10. A. M.—Was brought into hospital at eight o'clock. He reports that when working on the roads yesterday he vomited two or three times. In the evening he eat a little rice, and slept pretty well last night. Had several watery stools this morning, and, when brought to hospital, had no pulse at the wrist. Skin very cold; features collapsed; breath cold. No pain or uneasiness. Is very weak. Speaks distinctly. Intellect clear. Has taken two scruples of calomel, half an ounce of cardamoms, and some warm water. A strong blister has been applied to the abdomen and chest; cataplasms to his legs and feet; and hot sand is constantly applied to his arms.

Affigantur hirudin. xvi. Temporibus. Sumat stat. Extract. Colocynth. Comp. gr. ix. et superbib. Tinct.

Cardamom.  $\zeta$ ss. in paululo aquae tepidae.

R̄. Tinct. Opii grs. xxx.

Tinct. Cardamomi  $\zeta$ ss.

Aquae tepidae  $\zeta$ ii. Misce, omni hora summend.

Aqua oryzae pro potu.

12, noon.—Has taken one dose of laudanum and tincture of cardamoms. Fourteen leeches have adhered to his temples. Complains of pain from the sinapisms. No pulse. Skin cold. No perspiration. Intellect perfectly clear. Voice weak.

℞ Infus. Piper. Nigri ℥ x.

Ol. Ricini ℥ij. Misce, ft. enema statim injiciendum.

5, p. m.—Has had two glysters, which came away without any thing else, shortly after the last was injected. No other medicine has been given. The leeches appear to have drawn about twelve ounces of blood, which, after having stood about two hours, is black, fluid, of the consistence of honey, without having separated any serum. Pulse perceptible at the wrist, 130, very small. Complains of a burning sensation from the sinapisms and blister. Voice fuller. Skin cool. No perspiration.

℞ Infus. Sennæ Comp. ℥iv.

Tinct. Rhei ℥ij. Misce stat. sumend.

Contin. arena calida et aqua oryzae.

4th, 7, a. m.—Has had a copious turbid watery evacuation this morning, consisting partly of some of the enema. Complains only of the blister, which has risen a little. Countenance much improved. Pulse pretty



full. Skin natural. Tongue furred, brown. The blood which was drawn by the leeches continues black and fluid.

Habeat aquam oryzae ad libitum.

5th, *Mane*.—Had one thin yellow feculent stool yesterday forenoon. The blister rose pretty well. Pulse 90, pretty full. Tongue furred, brown in the middle. Skin natural.

Sumat stat. Ol. Ricini ꝑi.

6th, Convalescent.

## CASE IX.

*Dharwar, 8th September 1826.*

YELLAH, *Male Convict*, æt. 45.—6½ A. M. Has just been brought to hospital. Reports that he vomited once or twice yesterday when at work on the roads, and was purged two or three times; but that he eat his dinner, and slept pretty well during the night. He vomited again this morning. Features much collapsed; skin deadly cold. No pulse. Is extremely weak. Voice weak. Breath cold. Is perfectly sensible; and complains only of thirst. Mouth moist, with a good deal of mucous saliva. No perspiration.

Sumat. stat. Calomel ℥ij. et superbibat Tinct. Cardamomi ℥ss. et Tinct. Opii. ℥i. in paululo aquae tepidae. Admoveantur empl. epispast. abdomini et pectori, sinapismi pedibus et arena calida brachiis.

Affigantur hirudin. xxx. temporibus.

Habeat aquam oryzae calidam pro potu.

9, A. M.—No alteration. Has not vomited or been purged since last report. Intellect clear. Complains of thirst, and of burning from the cataplasms.

℞ Submur. Hydrarg.

Extract. Colocynth. Comp. ā ā gr. x. Misce, ft. bolus s.s. et superbibat Tinct. Cardamomi ℥ss. in paul. aquae tepidae.

℞ Ol. Ricini ℥ij.

Tinct. Cardamomi ℥ss.

Aquae Tepidae ℥xij. Misce, ft. enema statim injiciend.

11, A. M.—Retained the enema about a quarter of an hour, when it brought away a quantity of serous fluid and white flakes. No vomiting. Thirst continues. Pulse very indistinctly perceptible at the wrist; stops occasionally for a few seconds, and is again renewed. The leeches have dropped off, after having drawn about twelve ounces of blood, which is black, mixed with a

few red spots and streaks, and is of the consistence of liquid honey.

Rep. Hirudin. xx.

℞ Tinct. Cardamomi ℥ss.

Aquae tepidae ℥ij. Misce, omni hora sumend.

5, P. M.—Has had two white watery stools since last report. Complains only of the pain from the blister and cataplasms. Pulse not perceptible at the wrist. Thirst less. About ten ounces more blood have been procured, which is watery, of a black colour, with a dash of red.

℞ Infus. Sennae Comp. ℥ij.

Tinct. Rhei ℥ss.

Cardamomi ℥ss. M. stat. sumend.

Rep. Hirudin. xx.

About ten or twelve ounces of black fluid blood were drawn by the leeches. The patient continued without any suffering, and died at 10, P. M.

#### DISSECTION.

*Abdomen.*—Great venous congestion in the mesentery, stomach, and intestines; the mesenteric veins being much distended, and their ramifications traceable over the intestines, which were thus rendered of a purple colour. Stomach much contracted, and con-

tained a small quantity of turbid serous fluid, mixed with white flakes. Its mucous membrane exhibited numerous purple spots, and was lined with a whitish viscid substance. The small intestines, thin and much distended, contained a large quantity of grey fluid, mixed with grey or white flakes, and several lumbrici. Their mucous membrane was thin, easily lacerated, in some places white, in others pinkish, and in others purple coloured. Large intestines contracted, except a part of the ascending colon, which was very much distended; they contained a considerable quantity of a purulent matter, and their mucous membrane was in some places of a deep purple, in others white, or of a pinkish colour. Spleen soft, flabby, and *containing not a drop of blood*. Liver healthy, with very dark-coloured blood in its large veins. Gall-bladder distended with healthy bile. Urinary bladder contracted. Its mucous membrane exhibited traces of venous congestion, and was lined with viscid white mucous matter, which also lined the ureters.

*Thorax*.—Extensive pleuritic adhesions. Much venous congestion in the lungs. A good deal of white froth in the trachea and bronchia; their mucous membrane lined with a diaphanous mucus. A small quantity of blood in both sides of the heart.

*Head*.—Meningeal veins loaded with black blood. Drops of black blood issued from the divided surfaces

of the brain. Much congestion in the upper part of the spinal marrow.

Obs.—I have never in any case observed so much venous congestion as in this. None of the morbid appearances in the viscera in this case can be attributed to inflammation, but solely to venous congestion; the turgid mesenteric veins being in many places traceable to the purple patches on the intestines. An interesting circumstance in this dissection is the total want of blood in the spleen, which must be attributed to the great determination of the blood from all the other parts of the body towards the mucous system, the seat of increased action. It necessarily happens that the liver is also generally the seat of great congestion; for through it must all the blood pass from the stomach and intestines in its return to the heart.

The following is a mixed case, exhibiting symptoms, both of inflammation and increased secretion.

### CASE X.

*Dharwar, 12th July 1826.*

Lieutenant S———— had for some time been labouring under a derangement of his stomach and bowels; having occasionally slight nausea and diarrhoea. This complaint had been removed, and he was suffi-

ciently well to attend to his various duties. When out in the middle of the day in his palankeen, he became rather suddenly sick, and vomited what he had eaten at breakfast, and also a little bile. He considered this to be merely a return of his stomach complaint; and at the house of a friend he took forty drops of laudanum, which checked the vomiting. When he returned home the vomiting recommenced with violence, and was accompanied with purging. He sent for me immediately. Before I arrived he had vomited very often, and had been purged above twelve times. At first he vomited a large quantity of bile; but when I saw him he was vomiting transparent and nearly colourless serum. His stools were copious, watery, at first bilious, afterwards nearly colourless. When I first saw him, at one, P. M. he complained of a sinking at his stomach, pain in his abdomen on pressure, thirst, and parched mouth, and two or three times of spasms in the muscles of his neck and calves of his legs. His features were considerably collapsed—pulse at the wrist thready—skin warm. Sixty drops of laudanum were given to him in a little warm water. Two veins were opened in his arm; and, with considerable difficulty, about fourteen ounces of rather dark-coloured blood were obtained. A large blister was applied to his abdomen, and cataplasms of mustard and capsicums to his feet. The laudanum was retained about a quarter of an hour, when vomiting re-



commenced. A scruple of calomel was then given, and was washed down with one dram of æther, thirty drops of laudanum and some warm water. Warm barley-water was given to him occasionally. After the bleeding, his pulse improved a little; he retained the medicines and barley-water; and by four o'clock there was a great improvement; the vomiting and purging having ceased, and the spasms having been entirely removed. He took no more medicine; and I left him with directions that he should only have some barley-water with a little white wine. I saw him again at seven o'clock, when he told me he had perspired a good deal and now felt perfectly easy. He had a feculent evacuation next morning; his mouth became slightly affected by the calomel, and he speedily recovered.

Obs.—In this case the bilious vomiting, pain in the abdomen, thirst, parched tongue, and spasms, clearly shew that there was inflammation of the gastro-enteric mucous membrane. The collapsed features, small pulse, great discharges of serum by vomiting and stool, prove that the action of the secretory vessels of the gastro-enteric mucous membrane was increased. The indications of cure were evidently, first, to repress the vomiting in order to enable the other medicines to remain on the stomach; secondly, to diminish the increas-

ed, and to restore the healthy action of the gastro-enteric mucous membrane ; thirdly, to restore the circulation towards the surface. The first was effected by means of the laudanum and æther ; the second, by means of the bleeding, calomel and laudanum, assisted by all the other remedies ; the third, by means of the blister and sinapisms, by the general stimulating property of the calomel, and evidently also by the venaesection.

THE END.









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